U.S. Private Network Service

Penetration Strategy

Interim Status Meeting

INPUT

DGW

U.S. Private Network Service Penetration Strategy Interim Status Meeting

for

British

TELECOM

International

By: INPUT
1280 Villa Street
Mountain View, CA 94041
(415) 961-3300
Telex 171407 Fax (415) 961-3966

January 20, 1989

Note: This material represents preliminary and incomplete
findings subject to change in the final report and presentation.

BTI Interim Meeting Agenda

January 20, 1989

		Person
I.	Project Overview & Status	Denny White
	1. BTI Study Objective	
	2. Project Team	
	3. Accomplishments to Date	
	4. Schedule	
	5. Interim Meeting Objectives	
II.	Research Findings	
	1. User Survey Results	Denny
	2. Competitive Environment	Marc Matheson
	3. Product and Service Overviews	Marc
	4. Field Service Overview	Buddy Stigler
	5. Required Product Support	Buddy
	6. Market Forecast Status	Denny
	7. Customer and Vendor Requirements Definitions (vs. Business Success Factors)	Denny
III.	BTI Strategy Options (Preliminary)	Denny
IV.	Recommendations for Conclusion of Study Effort	All
	1. Strategy Recommendations	
	2. Study Plan Regarding	
	• Vendors to Profile (Review Examples)	
	• Key Issues	

BTI Study Objective

Recommend one or more strategies for rapid (2 year) penetration of the U.S. market for private network services (design, implementation, operation, and field support).

INPUT

Project Scope

- Market Forecasts

- Product and Service Overviews

- Required Product Support

- Customer and Vendor Requirements Definition

- Vendor Profiles

- Market Penetration Requirements

Deliverables

- *Network Management User Requirements* Report

- PreliminaryDraft Presentation for BTI Review

- Presentation (Interim/CA, Final/London)

- Written Report

INPUT

BTI Study Characteristics

Our Experience:

- Very Challenging Project

- Private Network Market Has Many "Faces"

- Language/Terminology Not Fully Established

- Some Patterns Emerging

- Dynamic Changes Occurring

INPUT

INPUT Research Team

Project Manager: Denny White
                          Director, Custom Research

Four Senior Personnel: Alex Graham
                          Buddy Stigler
                          Marc Matheson
                          Denny White

Five Research Analysts

Project Locations: Mountain View, CA
                          Parsippany, NJ

Executive Review: Bob Goodwin
                          Vice President, Research

                          Peter Cunningham
                          President

Capabilities:

- Nineteen years experience
- Marketing and business strategy development, mergers and acquisitions
- Twelve vertical markets
- Venture capital startups, turnaround situations, medium-size public companies, and a Fortune 100 company

Background:

- Director of Marketing for Boole & Babbage, Inc.
- Director of Marketing for Syntelligence, Inc.
- Vice President Marketing for Tymshare INSG
- Vice President Marketing for Tymnet
- Manager Strategic Planning for Tymshare
- Manager Business Planning for McDonnell Douglas Automation

Education:

- BS Engineering, Northwestern University
- MBA, Washington University (St. Louis)

Capabilities:

- Over 20 years in telecommunications

- Planning and Marketing positions

- Voice and data

- Network Management

- System Development

Background:

- General Manager of International Consulting Firm

- Senior Consultant at Arthur D. Little

- General Manager VISA International

Education:

- BA Business, Grove City College

- MA International Management, American Graduate School

H.W. (Buddy) STIGLER
Manager, Customer Service Program
INPUT

Capabilities:

- More than 39 years in diversified IBM career

- System installation, maintenance, and software support

- Competitive analysis, needs evaluation, customer satisfaction

Background:

- Director of Planning, Measurements, I/S, Staff Services, Offerings and Special Bids

Education:

- B.S.E.E., Mississippi State

- M.S. Industrial Management, MIT (Sloan Fellowship)

Capabilities:

- 21 years in implementation and management of voice and data networks

- Telecom project planning and system design, installation and trouble shooting

- WANs and LANs

Background:

- Manager—Network Engineering for Quotron Systems

- Communications Manager for ITEL (including resale activities)

- Network Supervisor for VISA

Education:

- Business Administration, California State University

Interim Meeting Objectives

1. Review Status

2. Validate:

   - Approach

   - Depth/Breadth of Coverage

   - Presentation Formats

3. Consensus on Items Required to Complete Project

4. Set a London Presentation Date

Meeting Style

1. Informal Working Session

2. Different Prospectives = Different Opinions

3. Project Is Not Finished—Some Incomplete Results

4. Participate in Discussion; Help Us Focus the Effort

5. "Marbles..." Use It to Keep Discussion Productive and on Track!"

I. Project Overview and Status

A. Accomplishments to Date:

    1. User Interviews (35) and Preliminary Analysis

    2. Market Forecast Data Collection

    3. Product/Service Overviews

    4. Required Product Support

    5. Preliminary Strategy Scenarios

    6. Sample Vendor Profiles

B. Balance for Completion:

    1. BTI Feedback and Confirmation

    2. Do Any Rework Required

    3. Finalize Strategy Scenarios

    4. Do Vendor Profiles

    5. Develop Final Report & Presentation

    6. London Presentation

SCHEDULE (Q1-1989)   INPUT®

*Corporate Week   **Ending Date   †Working Days; ( ) UK

Activity	Project	DECEMBER 49 12/2	50 12/9	51 12/16	52 12/23	53 12/30	JANUARY 1° 1/6** 4(4)†	2 1/13 5	3 1/20 5	4 1/27 5	5 2/3 5	FEBRUARY 6 2/10 5	7 2/17 5	8 2/24 4	MARCH 9 3/3 5	10 3/10 5	11 3/17 5	12 3/24 5(4)	13 3/31 5(4)
5 Onsite Interviews																			
30 Phone Interviews																			
Market Forecast																			
Vendor interviews																			
Product Overviews																			
Req'd Prod. Support																			
Prelim. Strategy																			
Interum Meeting (1-17-89)																			
Vendor Profiles																			
Strategy Options & Recommendations																			
Propose Report/Presentation																			
Final Presentation in London 2/28/89																			

Name of Individual: D.G. White

Dept./Program: BTI

Date: 12/7/88

PLG 300/04
10/88(R)

Definitions

Private Networks - Combinations of transport services (lines) and equipment dedicated to the use of a single unique organization. Sometimes used to refer to lines only.

Network Management - The job of running networks, including network design, implementation, operations, and repair/maintenance. Also, a product or service that identifies, diagnoses, and specifies corrective action for network problems.

Field Service - Customer Service; Repair and Maintenance.

Network Design - Technology selection, architecture/structure, capacity planning.

Network Implementation - Planning, scheduling, ordering, installing, and testing lines and equipment.

Network Operations - Monitoring, problem management, network administration.

Network Repair and Maintenance - On- or off-site repair and maintenance of network facilities.
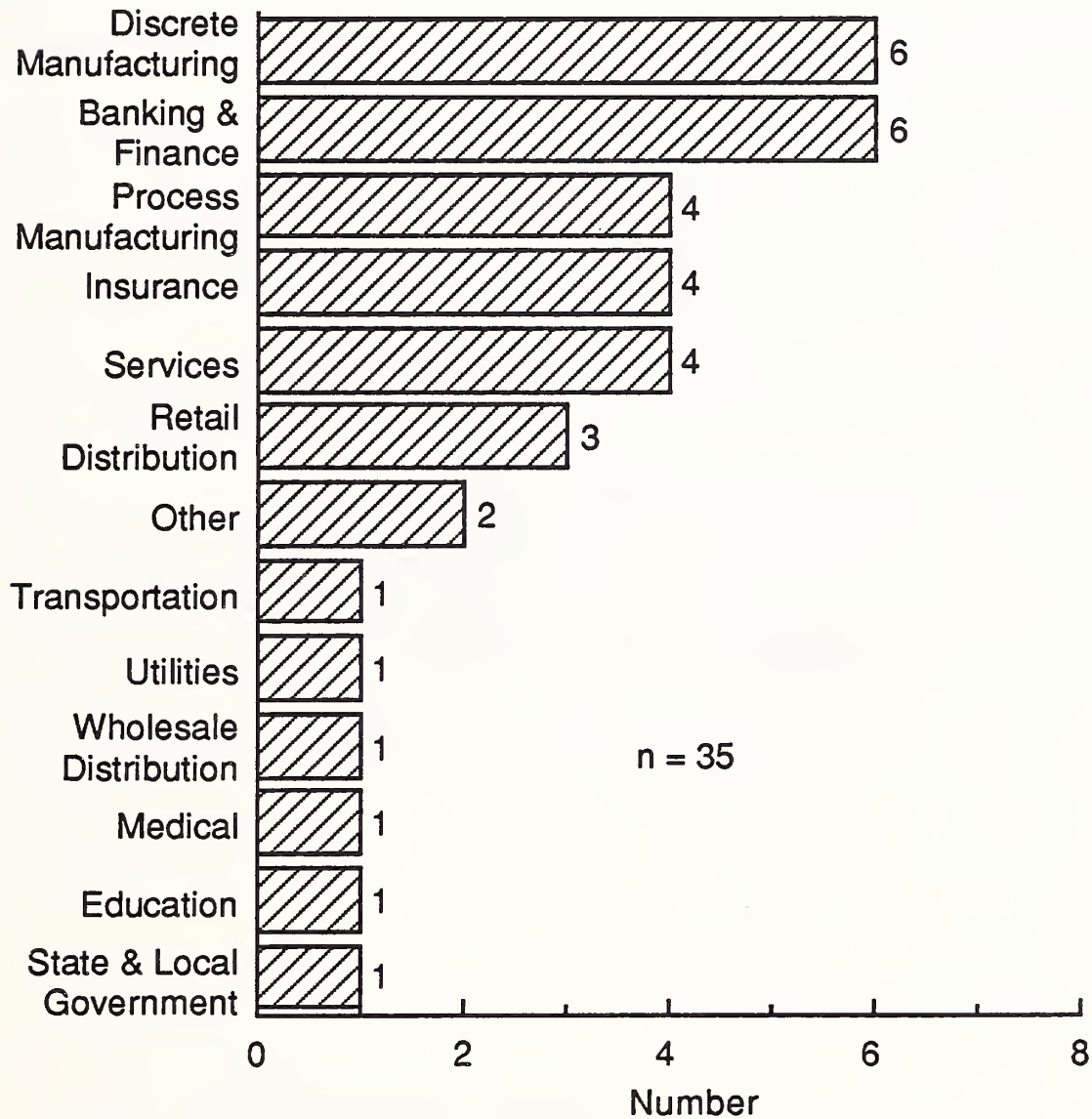
II.1 User Survey Results

Exhibit II-1

User Survey Sample Characteristics

1. Diverse Regarding Industry and Size of Firm

2. Emphasis on Middle Range of "Large" and "Medium" Size Organizations ($200 M to $4 B Sales)

3. Good Balance between Leading Edge (39%) and Middle of the Pack (45%) Users; 15% Were Laggards

4. 95% of Network Resources inside U.S.A.

5. Nationwide Networks (60%) vs. Regional (40%)

6. Most (70%) Have Multiple Special-Purpose Networks (Avg. 3 per Organization) Rather than a Single Integrated Network

EXHIBIT II-2

USER SURVEY
SAMPLE DISTRIBUTION BY INDUSTRY

Horizontal bar chart with x-axis labeled "Number" ranging from 0 to 8.

Industry	Number
Discrete Manufacturing	6
Banking & Finance	6
Process Manufacturing	4
Insurance	4
Services	4
Retail Distribution	3
Other	2
Transportation	1
Utilities	1
Wholesale Distribution	1
Medical	1
Education	1
State & Local Government	1

n = 35

Exhibit II-3

User Survey Organizations Interviewed

Very Large (>$4B) like "Fortune 100"

  *1. PG&E
   2. McDonnell Douglas (Discrete Mfg.)
   3. TransAmerica Corporation (Insurance)
   4. Unisys (Discrete Mfg.)

Large ($500M-4B) like "Fortune 100 to 500"

  *1. Del Monte (Discrete Mfg.)
   2. Nabisco/Confection Division (Process Mfg.)
   3. Church of Jesus Christ of Latter Day Saints
   4. Navistar Financial (Financial)
   5. American Express Travel (Financial)
   6. Crowley Maritime (Transportation)
   7. Intel (Discrete Mfg.)
 *8. Mervyns (Retail)
   9. World Savings (Fin.)
*10. Amdahl (Discrete Mfg.)
*11. Raley's (Retail)
  12. Brueners (Retail)
  13. United Fruit (Growers and Real Estate)
  14. Phelps Dodge (Mining)

* On-Site Interviews

Exhibit II-3 Cont.

User Survey Organizations Interviewed

Medium ($200-500M)

1. SRI International (Services)
2. CA Department of Fish and Game
   (State and Local Government)
3. First Security Bank (Financial)
4. Blue Cross of New York (Insurance)
5. Quotron (Services)
6. Iron Oak Supply (Wholesale)
7. Data Products (Discrete Mfg.)
8. Allied Signal (Discrete Mfg.)
9. Kaiser Engineers (Services)
10. Simplex Time Recorder (Process Mfg.)
11. Oregon Bank (Fin.)
12. S.F. Federal Savings and Loan (Fin.)

Small ($50-200M)

1. Good Samaritan Hospital (Medical)
2. University of San Francisco (Education)
3. On-Line Business Systems (Services)
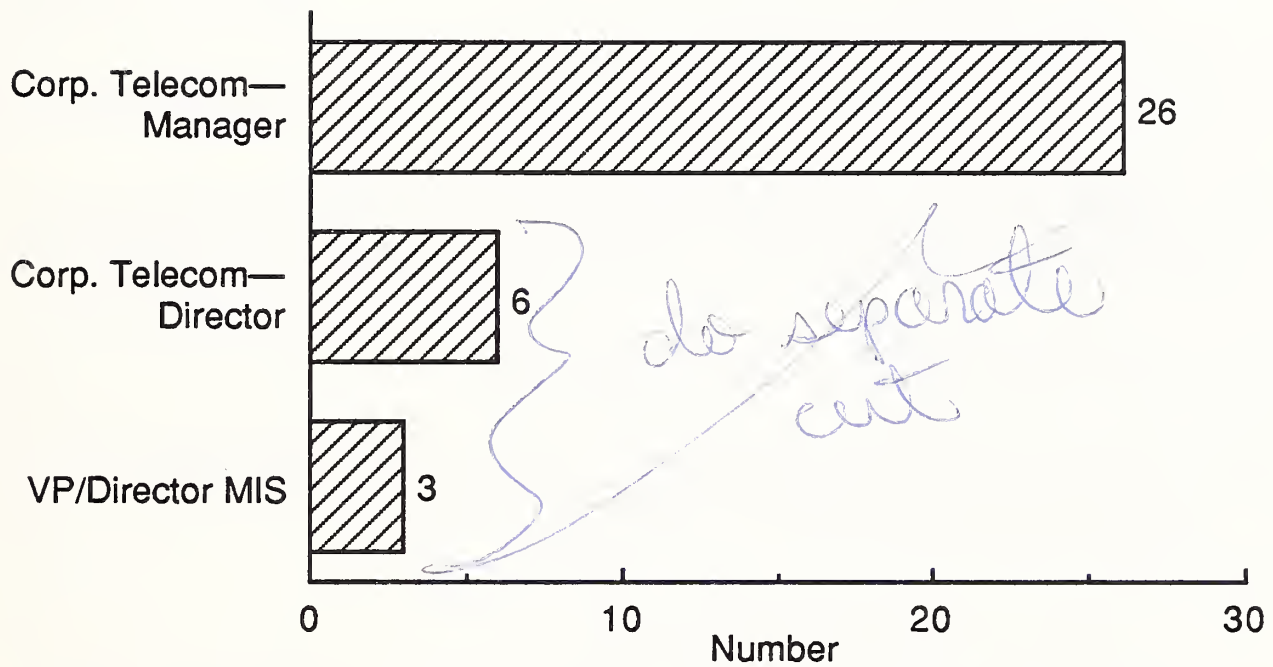*4. Delta Dental (Insurance)
5. Specialty Brands (Process Mfg.)

* On-Site Interviews

Exhibit II-4

User Questionnaire

1. 12 Pages Long

2. Over 300 Response Fields

3. Captured Narrative as well as "Hard" Responses

4. Covered:
   - Network Demographics
   - Experience with
     - Design
     - Implementation
     - Operations
     - Repair & Maintenance
   - Future Outlook in Same Four Areas
   - Reaction to Proposed Offering
     - Knee Jerk
     - Likes/Dislikes
     - Alliances
     - Foreign Ownership
     - Acid Test

EXHIBIT II-5

USER INTERVIEWEE PROFILE

A horizontal bar chart titled "USER INTERVIEWEE PROFILE" with the x-axis labeled "Number" ranging from 0 to 30.

- Corp. Telecom—Manager: 26
- Corp. Telecom—Director: 6
- VP/Director MIS: 3

Handwritten annotation: "do separate cut"

- Long Interview 50 Minutes +
- Most Only Partially Complete

Exhibit II-10

User Perceived Need for Network Repair and Maintenance Services

1. 93% Say It's Not a Problem

   - Equipment Is Reliable
   - Spares Are on Site
   - Fed Express when Necessary

2. 78% Say Looking for Improvement in Field Services Is a Low Priority

   "If It Ain't Broke, Don't Fix It!"

3. Most Feel Their Dealings with the Multivendor Environment Are Very Satisfactory...

   - They Average 7 Vendors
   - Probably Are Mentally Resigned to This Situation

Exhibit II-11

Where Are the Equipment Problems?*

	Network Equip.	Related Equip.
Most Problems	Modems	PBXs
Least Problems	Muxes	PCs

* Small sample of respondents to this question plus wide variations in data suggest not taking these results too seriously.

Exhibit II-12

Who Is Providing the Service?

A. Equipment Vendors   55%
   Third-Party Maintenance Firms (TPM)   10%
   In-House Staff   <u>35%</u>
                                                        100%

B. Strong Preferences

   • 80% Use Two or More of the Three Sources

   • Concentrations of 80% or Greater Field Service
     Work Were:

   Equipment Manufacturer   15
   TPM   1
   In-House   <u>8</u>
   Total Users with $\geq$ 80% Concentration   24
   in One Field Service Source

Exhibit II-13

Problem Resolution
Satisfaction Levels

could be compt advantage
— real need (requires
education)

"Major Problem" 5—

— 4.4 Timely Response and Repair Time

4—

"Tolerable—Can
Live with It" 3—

— 2.7 Quality—Getting It Fixed Right the First Time
— 2.6 Cost of Field Service Repair
  2.6 Diagnosing Which Equipment Is at Fault
— 2.4 Separating Equipment from Communication
   Services Problems

2—

"No Problem" 1—
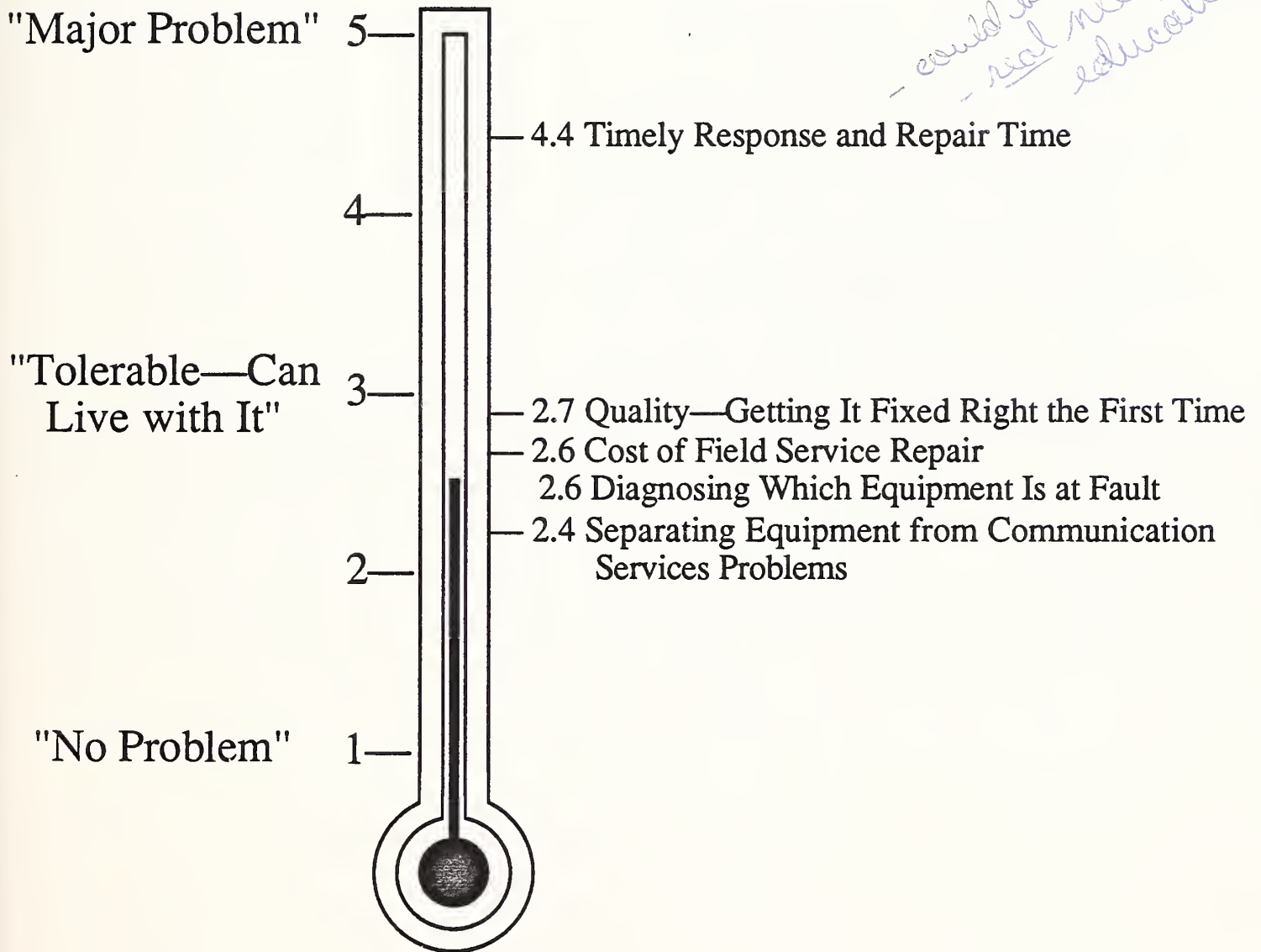
Exhibit II-14

Under What Circumstances Would You Put All Your Repair and Maintenance Business in the Hands of a Single TPM Firm? (Analysis of Narrative Comments)

Would Never Consider This	10

- Too Much at Risk
- Don't Want a Middle Man
- Want Control
- No One Could Do It Better than Us
- Too Specialized
- Not a Problem

If Less Expensive, Given Same or Better Quality Service	14
Faster Response Time	2
Network Management Expertise	1
Already Doing This and It's Great!	1

Exhibit II-15

Anticipated Problem Intensity Over Next Five Years

Highest "Pain" 5—

4—

— 3.4 Network Field Maintenance
— 3.2 Network Operations
3— — 2.9 Network Implementation

— 2.5 Network Design

2—

Lowest "Pain" 1—
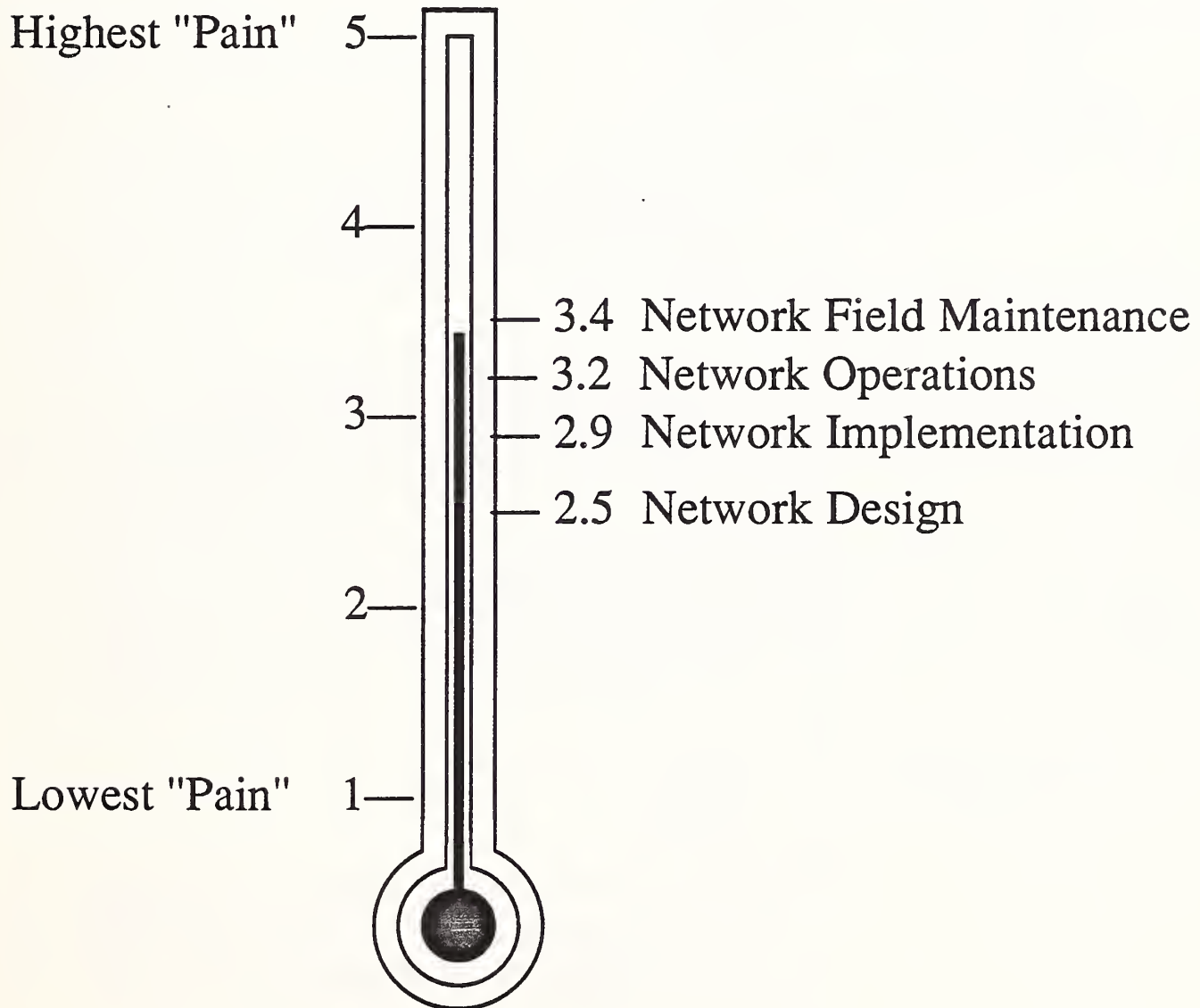
Exhibit II-16a

Knee-Jerk Reaction to a Proposed Offering of "Combined Network Management and Field Service—One-Stop Shopping for Network Design, Implementation, Operation, and Repair/Maintenance

"Great Ideal/ Just What Market Needs" 5 1

4 10

Neutral 3 13

2 8

"Doomed to Failure" 1 2

0   5   10   15

Number of Responses
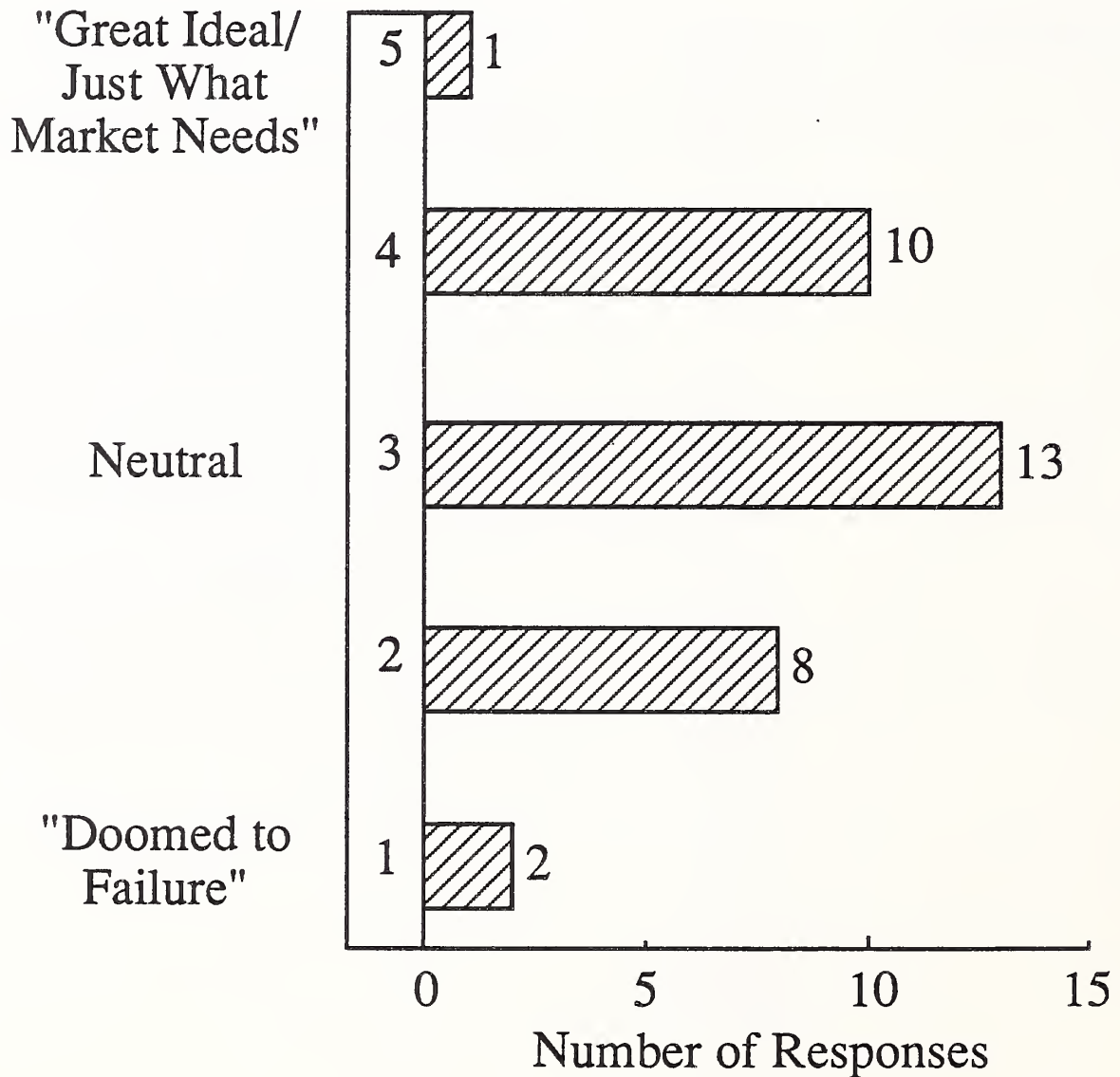
Exhibit II-16b

Knee-Jerk Reaction to a Proposed Offering of "Combined Network Management and Field Service—One-Stop Shopping for Network Design, Implementation, Operation, and Repair/Maintenance"

Positive Respondent Quotes:

- There's a Place for This but Not My Company
- I Want Pieces—Not Everything
- Depends on Specifics

Neutral Respondent Quotes:

- Untested Idea
- Would Try Pieces
- We're Too Big, Good for Smaller Shop
- Probably Good for Big Complex Shop, Not Our Simple One
- Interesting Idea, But Not Here

Negative Respondent Quotes:

- Unwilling to Give Up Control
- No One Can Do Everything Well!
- Hard to Sell; Need Isn't Great

Exhibit II-17

What Services Would You Consider/Not Consider Buying?

Yes—Would Buy	No—Would Not Buy

Network Design

43%   15   [bar]   20   57%

Network Implementation

34%   12   [bar]   23   66%

Network Operations

17%   6   [bar]   29   83%

Field Service

65%   22   [bar]   12   35%

-30   -20   -10   0   10   20   30

Number of Responses
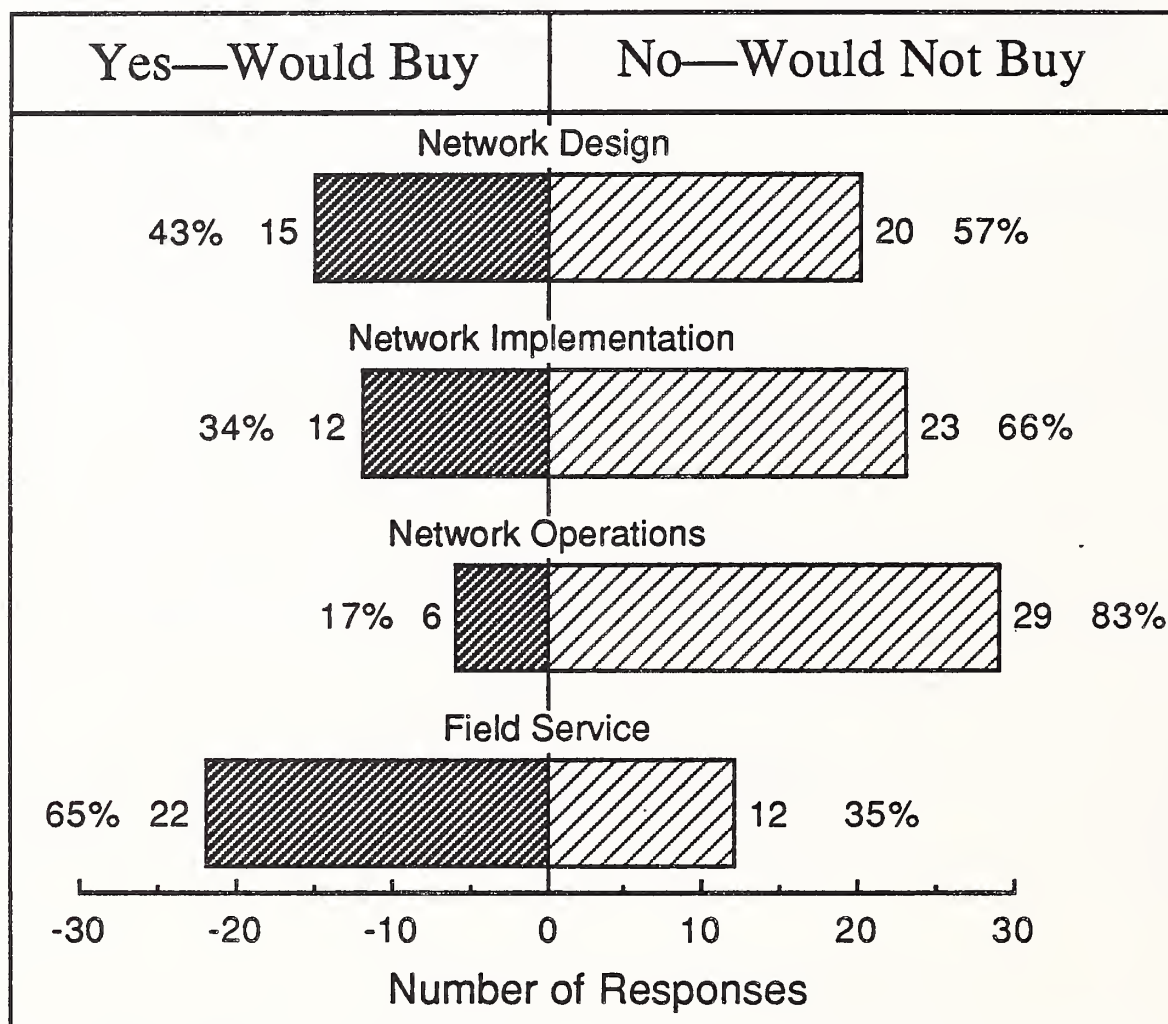
Would a TPM Field Service
<u>Alone</u> Be Sufficiently Attractive?

"Yes"   24   (75%)
"No"   8   (25%)

Exhibit II-18

What Will It Take to Win Your Business?

The "Minimum" Field Service Must Cover:

A. All Our Networks   52%

    Less Than All   48%

B. Both Voice and Data   68%

    Data Only   32%

C. All Network Equipment   67%

    Just Certain Items   33%

D. Domestic U.S. plus International   18%

    Nationwide U.S.   50%

    Regional U.S. Only   32%

E. Network-Related Equipment   (Unclear Need)

Exhibit II-19

Proposed Service Perception Biases

A. Vendor Use of Alliances

Favorable	3	(13%)
Unfavorable	6	(25%)
Neutral	15	(63%)

B. Reaction to Foreign Ownership

Favorable	0	(0%)
Unfavorable	2	(8%)
Neutral	22	(92%)

C. Where Is the Market?

	# Mentions	
Large Firms (Fortune 500/>$500 M Sales)	12	(24%)
Medium Size ($200-500 M Sales)	21	(42%)
Small Organizations ($50-200 M)	17	(34%)
	50	(100%)

Exhibit II-20

The Acid Test

"In Exchange for Special Terms, Would You Be Interested
in Becoming a Showcase Customer?"

Yes	6	21%
No	18	62%
Maybe	5	17%

II. Competitive Environment

1. Structure

2. Vendor Issues

3. Major Players

4. Specialists

5. Overviews of Twelve Supplier Types

6. Detailed Competitive Matrix

INPUT

Structure

- Highly Fragmented

- Many and Varied Players

- Major Players

- Specialists

Vendor Issues

- Scope of Offering

- Product versus Service

- Voice versus Data

- Motives

Major Players

- Computer Manufacturers

- Communications Equipment Manufacturers

- Telephone Companies

- Network Management Companies

- Shared Tenant Services Companies

Specialists

- Third-Party Maintenance Companies

- Shared Tenant Services Companies

Competitive Environment—
Computer Manufacturers

			NM System vs. Services		Scope of Offering			
			Sys	Svc	Des	Imp	Optn	F/S
1.*	IBM	Netview/Spectrum	D	D	D	D	D	L
2.*	DEC	Enterprise Mgmt Architect	D	D	D	D	L	L
3.*	HP			D	D	D	D	L

Key:
* = Known vendors of Network Management Service
X = Voice and Data
V = Voice only
D = Data only
L = Limited to its own field

F= Full service (use alliances?)

Competitive Environment—
Communications Equipment
Manufacturers

	NM System vs. Services		Scope of Offering			
	Sys	Svc	Des	Imp	Optn	F/S
1.* Harris Corp.		D	D	D	D	L
2.* Timeplex	X	X	X	X	X	L
3. Network Equipment Technologies	X	X	X	X	X	L
4.* Codex (Online)	D	D	D	D	D	L
5.* ATT/Paradyne Netcare	D	D	D	D	D	L
6. General DataComm	D	D	D	D	D	L
7. Racal-Milgo	D	D	D	D	D	L
8. Atlantic Research	D		D	D		L

Key:
* = Known vendors of Network Management Service
X = Voice and Data
V = Voice only
D = Data only
L = Limited to its own field

INPUT

Competitive Environment—
Software Systems Manufacturers

	NM System vs. Services		Scope of Offering			
	Sys	Svc	Des	Imp	Optn	F/S
1. Avant-Garde	X			D		L
2. Cincom	D			D		L

Key:
* = Known vendors of Network Management Service
X = Voice and Data
V = Voice only
D = Data only
L = Limited to its own field

INPUT

Competitive Environment—
Telephone Companies

	NM System vs. Services		Scope of Offering			
	Sys	**Svc**	**Des**	**Imp**	**Optn**	**F/S**
1.* AT&T Unified Ntwk Mgmt Architect & Tariff 12	X	X	X	X	X	L
2.* Pacific Telesis Spectrum (now IBM)		X	X	X	X	L
3.* Contel Customer Support Division		X	X	X	X	
4.* BellSouth Systems Technology, Inc. (Shared Tenant)	X	X	X	X	X	L
5.* Pacific Telecom/Harbor Bay Telecom (Shared Tenant)	X	X	X	X	X	L

Key:
* = Known vendors of Network Management Service
X = Voice and Data
V = Voice only
D = Data only
L = Limited to its own field

Competitive Environment— Interconnects

	NM System vs. Services		Scope of Offering			
	Sys	Svc	Des	Imp	Optn	F/S
1. Northern Telecom				L		L
2. Rolm/Siemens				L		L
3. Nec				L		L
4. Mitel				L		L

Key:
* = Known vendors of Network Management Service
X = Voice and Data
V = Voice only
D = Data only
L = Limited to its own field

INPUT

Competitive Environment— System Integrators

	NM System vs. Services		Scope of Offering			
	Sys	Svc	Des	Imp	Optn	F/S
1. Computer Science Corp. (CSC)		D				
2. EDS						
3.* Xerox		D	D	D	D	L
4. PRC		D				

Key:
* = Known vendors of Network Management Service
X = Voice and Data
V = Voice only
D = Data only
L = Limited to its own field

INPUT

Competitive Environment—
Third-Party Maintenance Companies

	NM System vs. Services		Scope of Offering			
	Sys	Svc	Des	Imp	Optn	F/S
1. TRW Information Services						X
2. Sorbus/Bell Atlantic						X
3. GE						L
4. Interlogic Trace						
5. CDC						
6. Idea Servcom						
7. Decision Data						
8. Data Serv / Bell South						
9. Unisys						
10. Grumman						
11. All Phase						

Key:
* = Known vendors of Network Management Service
X = Voice and Data
V = Voice only
D = Data only
L = Limited to its own field

Competitive Environment—
Electrical Contractors & Installation

	NM System vs. Services		Scope of Offering			
	Sys	Svc	Des	Imp	Optn	F/S
1. Henkels & McCoy		X	L	X		
2. Volt		X	L	X		

Key:
* = Known vendors of Network Management Service
X = Voice and Data
V = Voice only
D = Data only
L = Limited to its own field

Competitive Environment—
Network Management Companies

	NM System vs. Services		Scope of Offering			
	Sys	Svc	Des	Imp	Optn	F/S
1.* Network Management Inc. (CRC Cnslt) *Contel*		X	X	X	X	L
2.* Netline Communications Corp.		D	D	D	D	L

Key:

* = Known vendors of Network Management Service

X = Voice and Data

V = Voice only

D = Data only

L = Limited to its own field

INPUT

Competitive Environment—
Shared Tenant Companies

	NM System vs. Services		Scope of Offering			
	Sys	Svc	Des	Imp	Optn	F/S
1.* Bramtel		V	V	V	V	V
2.* MK Technologies/Morrison Knutson		X	X	X	X	L

Key:
* = Known vendors of Network Management Service
X = Voice and Data
V = Voice only
D = Data only
L = Limited to its own field

Competitive Environment—
Value-Added Network (VAN)
Companies

	NM System vs. Services		Scope of Offering			
	Sys	Svc	Des	Imp	Optn	F/S
1. Tymnet	D		D	D		
2. Telenet						

Key:
* = Known vendors of Network Management Service
X = Voice and Data
V = Voice only
D = Data only
L = Limited to its own field

INPUT

Competitive Environment—
Large Network End-User Companies

	NM System vs. Services		Scope of Offering			
	Sys	Svc	Des	Imp	Optn	F/S
1.* Wells Fargo Bank	-	-	-	-	-	-
2. Xerox						

Key:
* = Known vendors of Network Management Service
X = Voice and Data
V = Voice only
D = Data only
L = Limited to its own field

COMPETITIVE ENVIRONMENT: NMS & F/S
January 12, 1989

<u>Key:</u>
* = Known vendors of Network Management Service
X = Voice and Data
V = Voice, only
D = Data, only
L = Limited to its own field

VENDOR	SYS	SVC	DES	IMP	OPTN	F/
Computer Manufacturers						
1.* IBM Netview/Spectrum	D	D	D	D	D	L
2.* DEC Enterprise Mgmt Architect	D	D	D	D	L	L
3.* HP		D	D	D	D	L
Communications Equipment Manufacturers						
1.* Harris Corp.		D	D	D	D	L
2.* Timeplex	X	X	X	X	X	L
3. Network Equipment Technologies	X	X	X	X	X	L
4.* Codex (Online)	D	D	D	D	D	L
5.* ATT/Paradyne Netcare	D	D	D	D	D	L
6. General DataComm	D	D	D	D	D	L
7. Racal-Milgo	D	D	D	D	D	L
8. Atlantic Research	D		D	D		L
Software Systems Manufacturers						
1. Avant-Garde	X			D		L
2. Cincom	D			D		L
Telephone Companies						
1.* AT&T Unified Ntwk Mgmt Architect & Tariff 12	X	X	X	X	X	L
2.* Pacific Telesis Spectrum (now IBM)		X	X	X	X	L
3.* Contel Customer Support Division		X	X	X	X	
4.* BellSouth Systems Technology, Inc. (Shared Tenant)	X	X	X	X	X	L
5.* Pacific Telecom/Harbor Bay Telecom (Shared Tenant)	X	X	X	X	X	L
Interconnects						
1. Northern Telecom				L		L
2. Rolm/Siemens				L		L
3. Nec				L		L
4. Mitel				L		L
System Integrators						
1. Computer Science Corp. (CSC)		D				
2. EDS						
3.* Xerox		D	D	D	D	L
4. PRC		D				

VENDOR	SYS	SVC	DES	IMP	OPTN	F/S
Consultants						
1.						
2.						
Resellers						
1. Allnet		X				L
2.						
Third Party Maintenance Companies						
1. TRW Information Services						X
2. Sorbus/Bell Atlantic						X
3. All Phase						L
Electrical Contractors & Installation						
1. Henkels & McCoy		X	L	X		
2. Volt		X	L	X		
Distributors & Retail Outlets						
1. Sears						
2.						
Network Management Companies						
1.* Network Management Inc. (CRC Cnslt)		X	X	X	X	L
2.* Netline Communications Corp.		D	D	D	D	L
Shared Tenant Companies						
1.* Bramtel		V	V	V	V	V
2.* MK Technologies/Morrison Knutson		X	X	X	X	L
Value Added Network (VAN's) Companies						
1. Tymnet	D					
Large Network End-User Companies						
1.* Wells Fargo Bank	—	—	—	—	—	—

Totals

Key:
* = Known vendors of Network Management Service
X = Voice and Data
V = Voice, only
D = Data, only
L = Limited

Purpose of Product and Service Overviews

- Review the current status of the U.S. private network markets

- Identify technology/product trends

- Note market direction

- Review competitive environment

Note: all Forecasts are desk research based

Coverage

- Circuits
  - Leased Line
  - Dial-up Line
  - T-1 Systems
  - Satellite

- Value-Added Systems
  - Value-Added Network Service
  - Message
  - Electronic Data Interchange (EDI)
    - E-Mail
    - Facsimile

- Network Equipment
  - Modems
  - Multiplexers
    - Statistical
    - T-1
  - VSAT Terminals and Earth Stations
  - Microwave
  - Network Management Systems

- Network Related Equipment
  - Front-End Processor
  - Private Branch Exchanges (PBXs)
  - LANs
  - Telephone Key Sets
  - Personal Computers and Workstations
  - Dumb Terminals

- Miscellaneous/Other
  -Disaster Recovery

Private Line Network Categories

- Analog private lines—typically operate at 9.6Kbps but with special modems and conditioning can operate up to 19.2Kbps

- Digital Data Service (DDS) lines—can operate between 2.4Kbps and 56Kbps

- T-1 and T-3 lines—T-1 lines operate at 1.544Mbps and can be divided into 24, 64Kbps channels...T-3 operate at 45Mbps

Private Line Network Carrier Revenues

Rank and Vendor	1987 Revenue ($M)	1987 Market Share (Percent)
1. AT&T	5,657	68
2. MCI	748	9
3. US Sprint	499	6
4. ITT/USTS	141	2
5. Western Union	133	2
6. Contel/ASC	116	1
7. Allnet (ALC)	75	1
8. All others	951	11
Total Market	8,320	100

INPUT

Dial-up Lines

- Offer the greatest flexibility

- Dominated by voice and lower-speed data

- $55 billion in revenues

- Market dominated by AT&T

T-1 Technology

- Operated exclusively by AT&T and LECs since 1962

- First available to end users in 1977

- Substantially cheaper since first offering

- Useful as bulk-capacity transmission facilities

- Consolidates voice, data, and image

- Potential for local carrier bypass

- Market dominated by AT&T

INPUT

T-1 Network Circuit Forecast
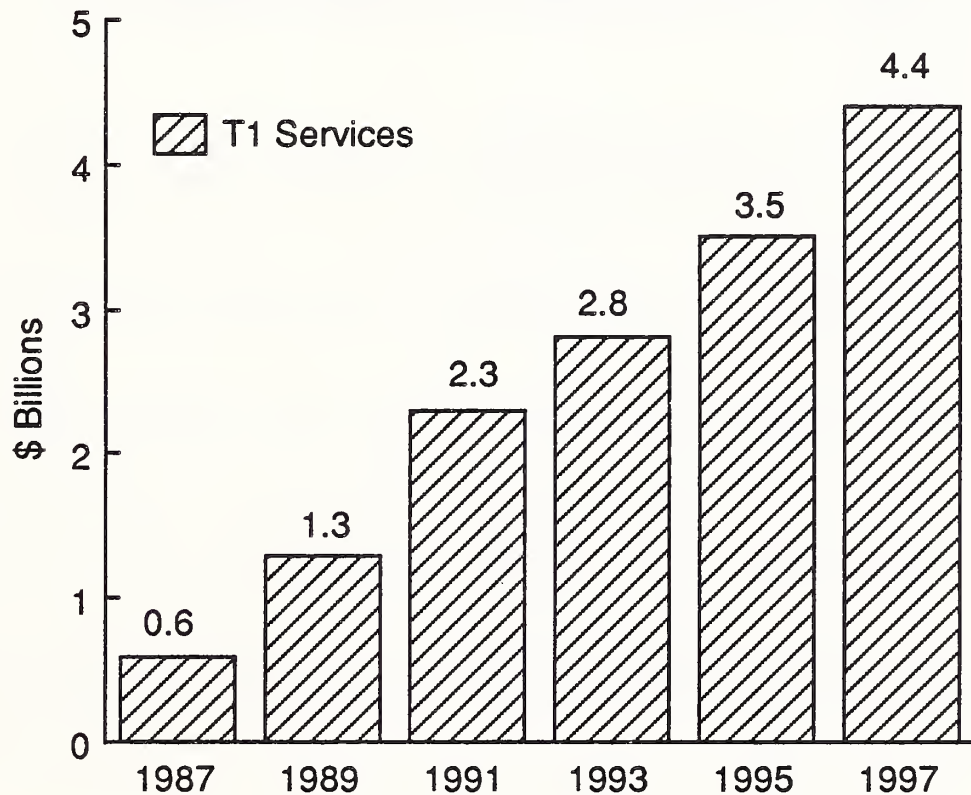
- 35% of Fortune 1000 companies will continue to use T-1.

- More than 400,000 T-1 lines should be in place by 1991.

Satellite Technology

- Reached its peak as primary medium for voice

- By mid-1990s, overall market share will level out

- Users selecting fiber optic technology over satellites

- Over-abundance of satellite capacity

- 65 domestic satellites in orbit, up to 30% decommis-
  sioned by 1993

- Replacement and insurance costs high after the shuttle
  disaster

Private Satellite Networks

INPUT
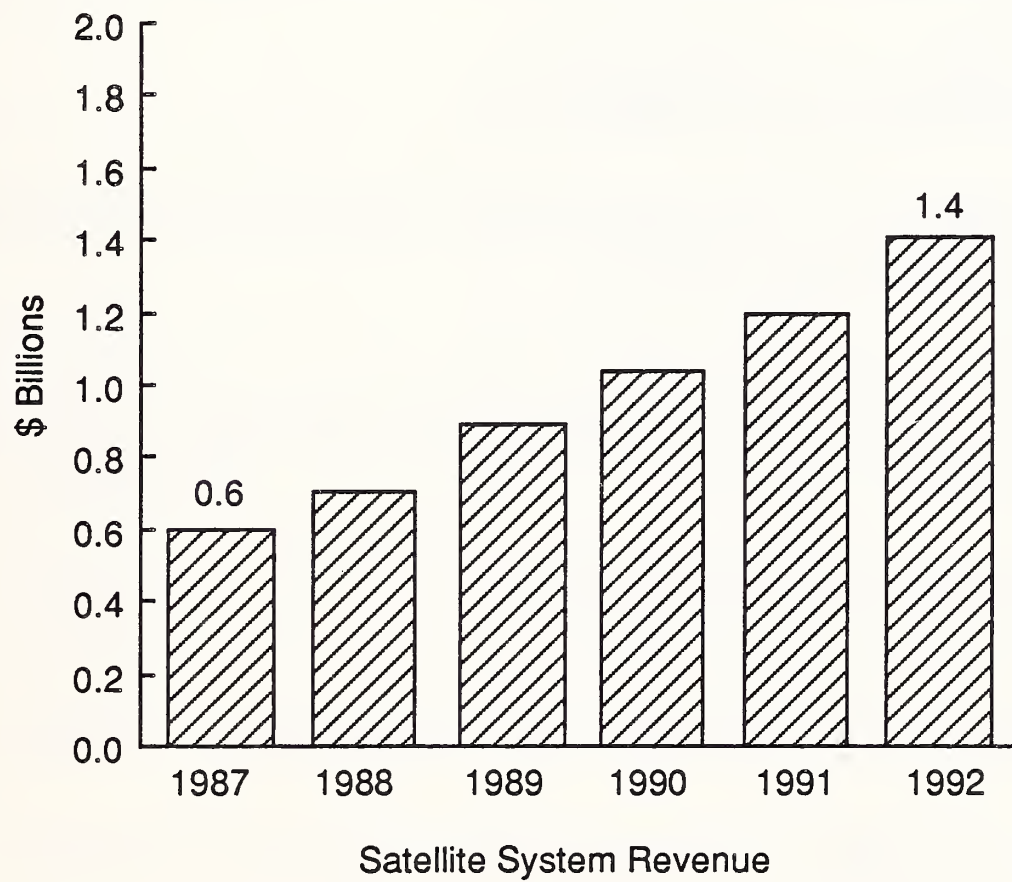
VAN Technology

- VANs have two primary roles:

  - Providers of "virtual network" service gives users instant worldwide access

  - Direct sale of technology for private special-purpose networks

- Technology is packet-based

- Appropriate for "timesharing" applications

- Links dissimilar systems and devices

INPUT

VAN Revenues

Rank and Vendor	1987 Revenue* ($M)	1987 Market Share (Percent)
1. Telenet	185	43
2. Tymnet	170	40
3. INFONET	30	7
4. GEIS	20	5
5. IBM	15	3
6. ITT WorldComm	5	1
7. MCI	2	1
Total Market	430	100

* Pure VAN network (transport) service, excluding application-based revenues

INPUT

VAN Environment

1. Leading Vendors: (Tymnet and Telenet)

   - Public services are transport-oriented

   - Have worldwide coverage via gateways to other countries

   - Also sell private packet networks

   - Will try to expand breadth of transport services with marginal success

INPUT

VAN Environment

2.   Smaller Vendors: (CSC, INFONET, GEIS, and IBM)

- Emphasize application-based services

- Also have substantial international coverage

- Could be "sleepers" regarding broader telecommuni-
  cations offerings—especially CSC and IBM

Message Technology

- Originated in the 1930s and peaked in 1960s

- Provides "dial-up" hard-copy electronic messaging

- Now on irreversible path of decline due to E-Mail and Facsimile

- $500 million in today's market, decreasing to $410 million by 1991

INPUT

Message Revenues

Rank and Vendor	1988 Revenue ($M)	1988 Market Share (Percent)
1. WUTCO	300	60
2. MCI	160	32
3. TRT	40	8
Total Market	500	100

INPUT

Electronic Data Interchange Technology

- Market is composed of two major industries:

    - Electronic Mail (E-Mail)
    - Facsimile (FAX)

- Both industries contributing to demise of Telex

- E-Mail is terminal-to-terminal transmission of text messages

- X.400 standard allows various E-Mail vendors to talk to each other

E-Mail Revenues

Rank and Vendor	1987 Revenue* ($M)	1987 Market Share (Percent)
1. Western Union	140	35
2. US Sprint	60	15
3. MCI Mail	48	12
4. General Electric	36	9
5. British Telecom	32	8
6. Others	84	21
Total Market	400	100

* Revenues include host & PC software

E-Mail Network Services Forecast
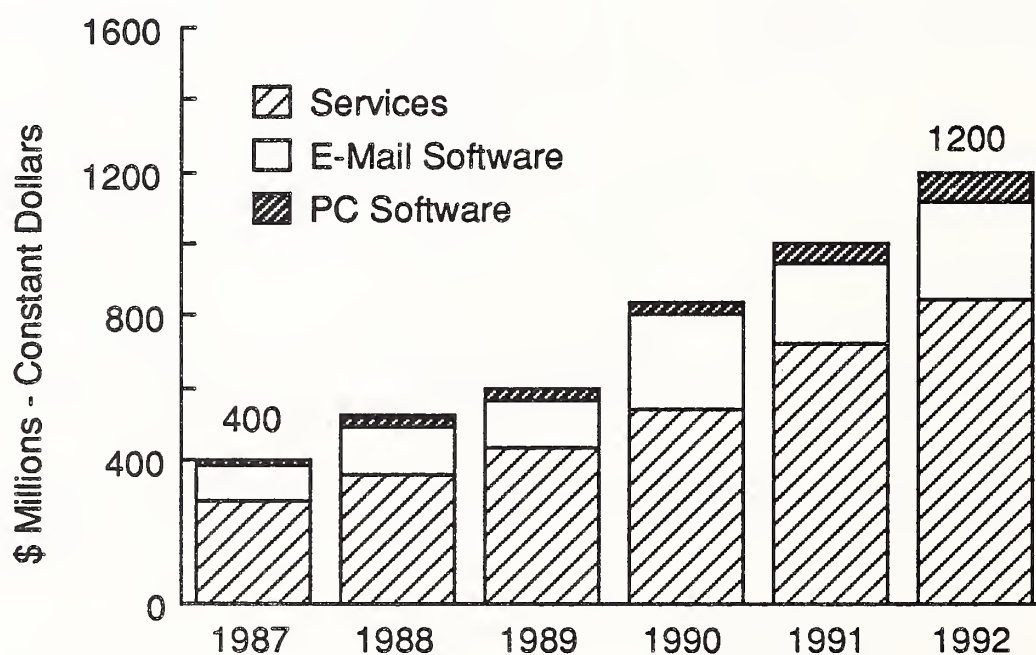
E-Mail Network Services Forecast

- 800,000 subscribers in 1987—projections suggest 2.7 million by 1992.

- E-Mail pricing will continue to decline.

- Other message mediums such as facsimile and voice mail will erode E-Mail's overall market share from 48% in 1987 to 30% in 1995.

ZBTI-17A

Facsimile Technology

- Scans text and graphics and sends over regular dial-up lines

- First faxes appeared in late 1960s

- Group 3 CCITT adopted standards in 1983

- Transmission speed now 10 to 30 seconds per page

INPUT

Facsimile Technology

- Unit prices have dropped from $20,000 to under $1,000

- Unit sales doubled to 465,000 in 1987

- Half the phone traffic between Japan and U.S. is facsimile

Facsimile Equipment Revenues

| Rank and Vendor	1987 Revenue ($M)	1987 Market Share (Percent)
1. Sharp Elect.	98	14
2. Ricoh Corp.	84	12
3. Canon USA	70	10
4. Pitney Bowes	57	8
5. NEC America	56	8
6. Panafax	55	8
7. Harris/3M	49	7
8. Xerox Corp.	48	7
9. Telautograph	38	5
10. Murata	31	4
11. Other	114	17
Total Market	700	100

INPUT

Electronic Messaging Systems Forecast

Legend:
- Computer-Based Message Systems
- Facsimile
- Voice
- Telex
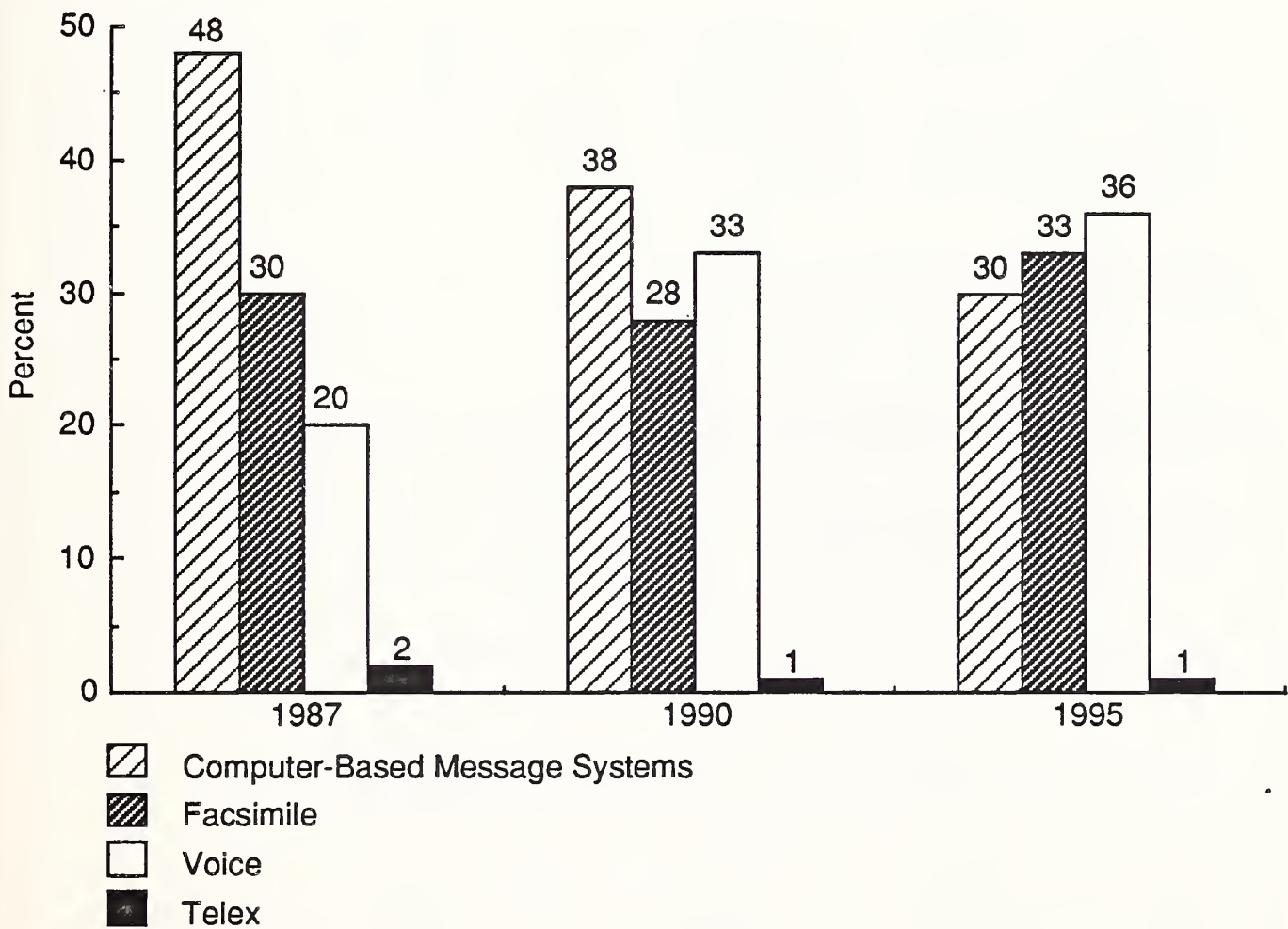
INPUT

ISDN Technology

- Integrated Services Digital Network provides environment for end-to-end flow of digital voice and data signals between user sites

Some of the features include:

- Common connections for voice, data, and video

- No special interfaces

- No modems

- Speed unlimited by conversions of any kind

- Multipoint and data conference calls from any telephone

- Digital handsets display caller and called parties and E-Mail capabilities

ISDN Equipment Forecast
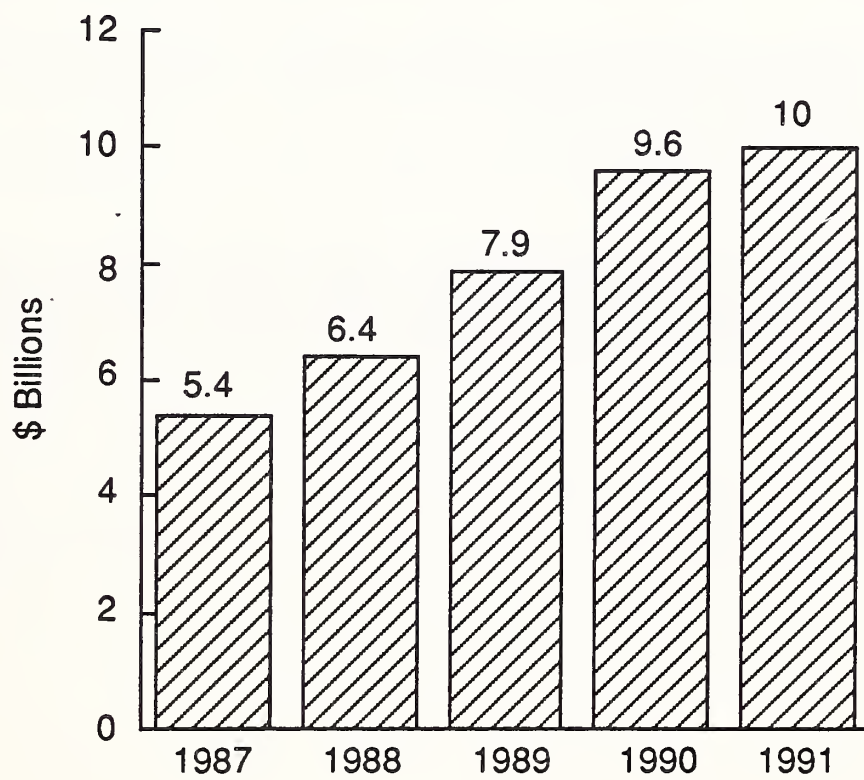
ISDN Equipment Forecast

- PBX's make up 75% or $3.4 billion of the current market

- By 1991, PBX's will have less share of the market but still account for $4.4 billion

- In 1990, digital handsets will have $740 million value and feature-heavy telephones will account for $1.2 billion

- ISDN-related services will be at $1.5 billion in 1991

ISDN Equipment Forecast

- By 1991, 69 U.S. central offices will have been converted to a local digital loop

- Full market "lift-off" will occur from 1992 to 1996

- Today's T-1 multiplexer manufacturers are already in demand and may be in the best position for ISDN network management

Modem Technology

- Modems translate a computer's digital signals into analog signals for transmission along analog telephone lines

- Modem market is fairly stable

- No changes in the top 12 vendors

- The same 12 have over 75% of the market

INPUT

Modem Equipment Revenues

Rank and Vendor	1987 Revenue ($M)	1987 Market Share (Percent)
1. AT&T	2,189	19.9
2. Codex (Motorola)	126	11.5
3. UDS (Motorola)	107	9.6
4. Paradyne (AT&T)	107	9.6
5. GDC	103	9.4
6. Racal-Milgo	89	8.1
7. Racal-Vadic	51	4.6
8. Case	41	3.7
9. Concord Data	25	2.3
10. IBM	22	2.0
11. Hayes	19	1.7
12. Others	194	17.6
Total Market	1,100	100.0

- Modem prices have come down to about one-third of 1970's costs

- Sales are will drop off in the mid-1990's due to ISDN

INPUT

Modem Sales Forecast
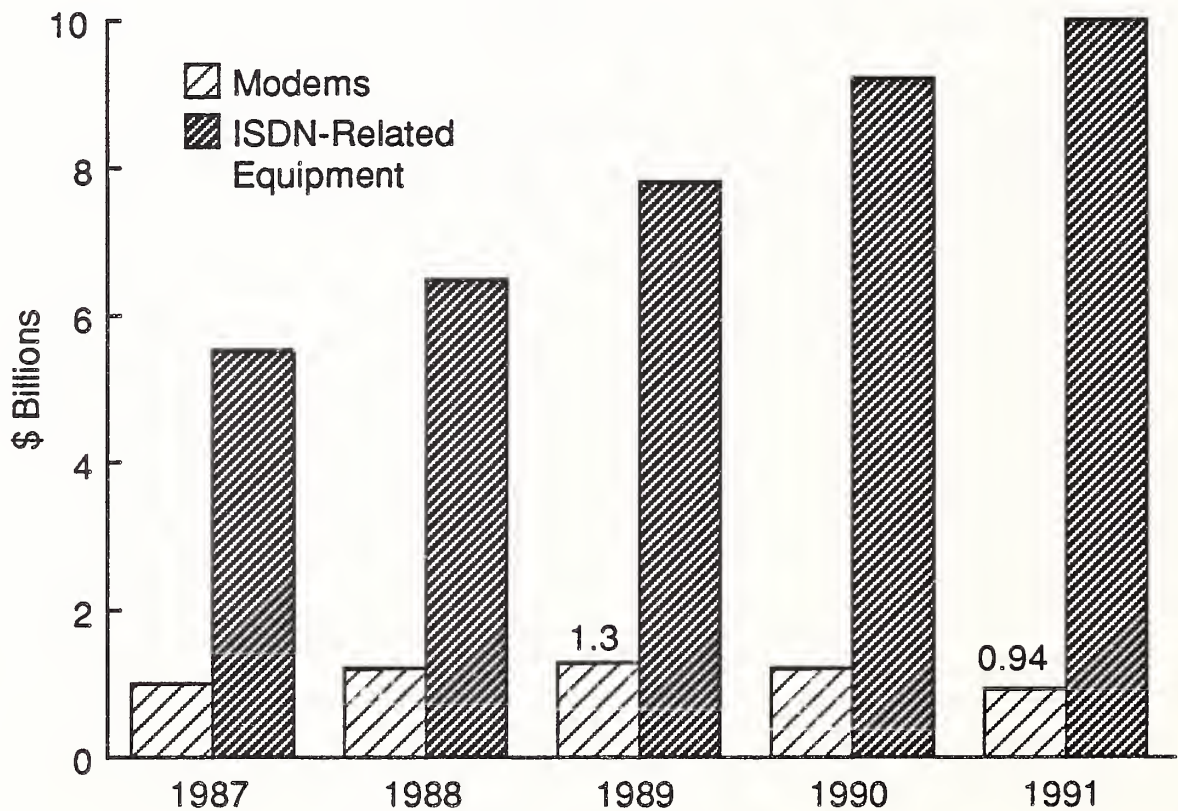
- Modem sales will peak at $1.3 billion in 1989

- Modem sales will decrease $940 million in 1992 as a result of the ISDN influence

INPUT

Multiplexer Technology

- The multiplexer (mux) market can be divided into 2 areas:

- Statistical (sub T-1) muxes
- T-1 muxes

- Stat mux market is increasing from $1.4 billion in 1987 to $7.2 billion by 1992.

Multiplexer Technology

- Stat mux vendors are about the same as the T-1 vendors except Codex and Racal Milgo, which rank in first place.

- T-1 muxes operate at 1.544 Mbps and can transmit multiple voice, data, and limited video.

- The T-1 mux providers may be the ones that most effectively manage the networks of the 1990s.
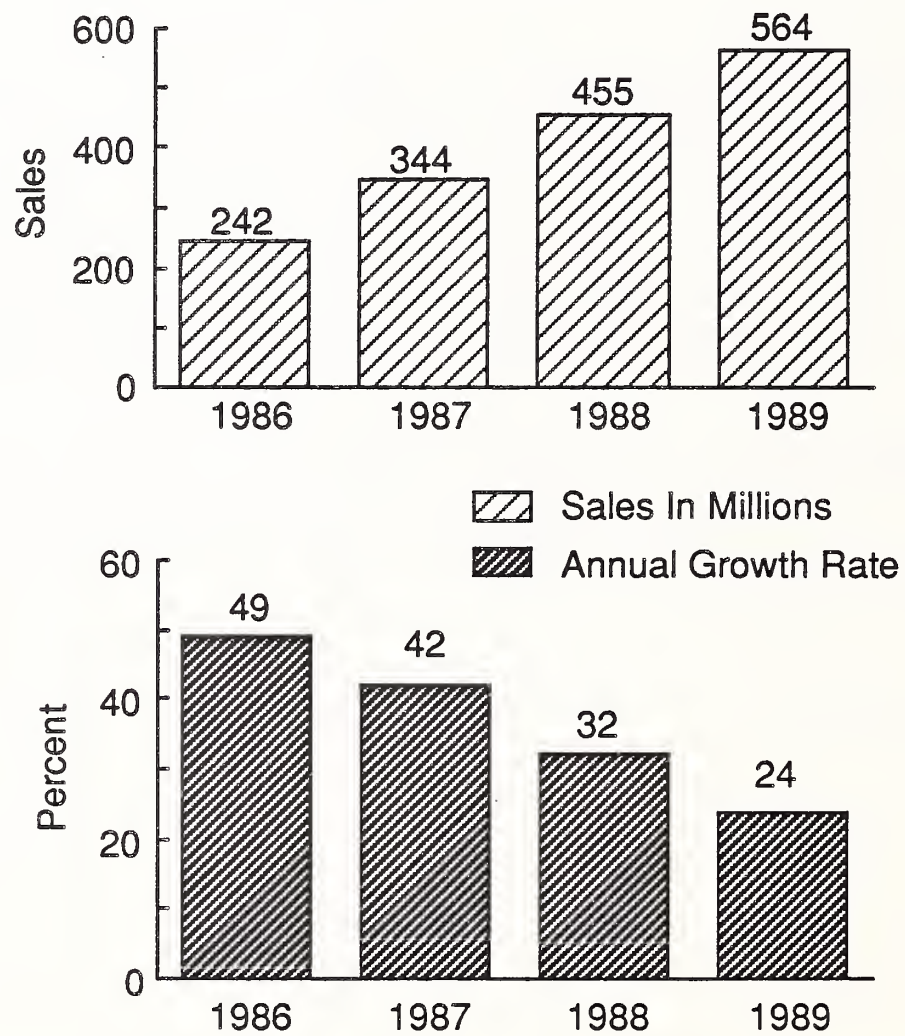
INPUT

T-1 Multiplexer Market Revenues

Rank and Vendor		1988 Revenue ($M)	1988 Market Share (Percent)
1	Timplex/Unisys	109	24
2	N.E.T./IBM	96	21
3	DCA/Cohesive	36	8
4	General DataComm	32	7
5	AT&T/Tellabs	32	7
6	Stratacom	23	5
7	Avanti	18	4
8	Infotron	14	3
9	Others*	95	21
	Total Market	455	100

* Others include Codex/Motorola and Racal-Milgo

T-1 Multiplexer Forecast

T-1 Multiplexer Forecast

- Annual growth rate will continue through 1992 at more than 20%, reaching $1 billion including market saturation and ISDN influence

- More than 400,000 T-1 lines should be in place by 1991

- More than 35% of the Fortune 1000 will continue to use T-1

VSAT Terminal and Earth Station Technology

- Very Small Aperture Terminals are evolving into multifeatured systems with significant capabilities at reasonable costs.

- End users now have much more control over performance, cost, and flexibility.

- Users have complete independence from traditional long-distance and local exchange facilities.

VSAT Terminal and Earth Station Technology

- Technology has expanded from one-way to two-way applications in retail, hotel, hospitals, airlines, pipelines, and data processing industries.

- VSAT market will grow 20% per year—from 10,000 terminals in 1987 to 100,000 by 1991.

- Total VSAT market will progress from $300 million to $500 million by 1990.

- Top 3 vendors (Hughes, Contel ASC, and GTE) have 75% of market.

Private Satellite Network Market Forecast
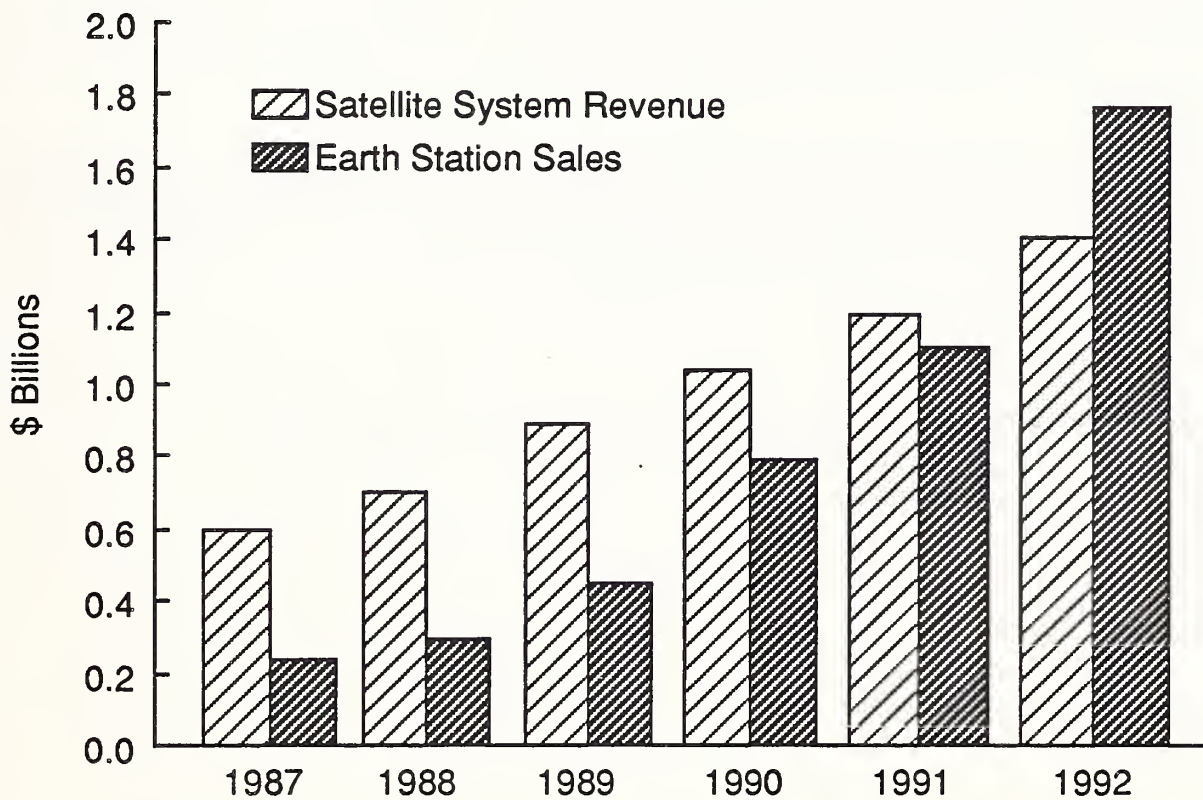
INPUT

Microwave Technology

- Short-haul digital microwave solves transmission/ connectivity problems for end users.

- Numerous applications include carrier bypass, access links from L.D. carriers, LAN bridges, and emergency backup.

- The private microwave market is on the rise.

INPUT

Microwave Technology

- The total 1988 digital microwave market is $405 million and will decline to $350 million by 1992.

- The short-haul private digital market is currently $50 million and will increase to $90 million by 1992.

Private Microwave Market Revenues

Rank and Vendor		1988 Revenue ($M)	1988 Market Share (Percent)
1	Digital Microwave	12	24
2	NEC America	9	18
3	Farinon/Harris	7	14
4	Ericson	6	11
5	Hughes	5	10
6	Other	11	23
	Total Market	50	100

Network Management Classifications

- Communications Test Equipment Specialists

- Modem and Multiplexer Manufacturers

- Network Management System Integrators

> Classify by product types
> rather than source of product
> (eg prod v. service)

ZBTI-33

Communications Test Equipment Technology

- Systems divided into manual and automated network test systems

- Combination of hardware and software diagnostic components and ancillary devices

- Vendors include Atlantic Research Corporation, Hekimian Laboratories, Inc., and Dynatech Data Systems

Modem and Multiplexer Manufacturer Technology

- Combination of integrated hardware and software diagnostic components

- Operates by augmenting modems with integrated intelligent test modules

- Systems allow the network technician to monitor all points and paths in the network, including modems, lines, and terminal equipment

Modem and Multiplexer Manufacturer Technology

- Performs diagnostic testing on network components and rapidly isolates problem areas

- Also performs administrative management, including circuit design, trouble tickets, etc.

- Vendors include Codex, Racal Milgo, and Paradyne

Network Management System Integrator Technology

- Includes the integration of Communications Test Equipment Specialists and Modem and Multiplexer Manufacturers

- Monitors all alarm messages from all network management/ diagnostic devices, strips off superfluous data, and presents status of all network components

- Vendors include Avant-Garde Computing, Inc., IBM, and Cincom Systems, Inc.

Network Management
Market Segments

Using a broad definition of network management, there are over 60 vendors in the field which generated $640 million in 1987 and over $700 million in 1988.

Network Management
Market Segments

The 1987 market can be broken into five market segments:

- Data comm network management equipment $200M

- Integrated software-oriented products   174M

- Switched telephone network equipment   115M

- Data comm matrix switches   100M

- T-1 network management equipment   51M

    Total Market $640M

Network Management
Market Revenues

Of the more than 60 vendors in the network management

arena, INPUT estimates that the following companies are

major players in the market:

Network Management
Market Revenues

Vendor (handwritten)

need a mkt fcst (handwritten)

Rank and Vendor	1987 Revenue ($M)	1987 Market Share (Percent)
1. Atlantic Research	38	6
2. Hekimian Laboratories	37	6
3. Dynatech Data Systems	35	5
4. IBM	27	4
5. Bytex Corporation	25	4
6. Keptel Inc.	22	3
7. Morino Associates	22	3
8. Avante-Garde Computing	20	3

INPUT

Front-End Processor (FEP) Manufacturers

FEP market was $1.11 billion in 1987.

FEP manufacturers are:

Vendor	Market Share
IBM	Dominant
DEC	
Amdahl	
NCR/Comten	
Hewlett-Packard	
Tandem	

INPUT

PBX Market Classification

As of 1987, the PBX market breakdown was:

PBX Voice	$3.10B
PBX Data	$ .98B
PBX Voice/Data	$ .90B
Total Market	$4.98B

PBX Market Classification

- The voice-only market should decrease by as much as 15% through 1991.

- The data-only PBX market should stay fairly flat.

- The voice and data PBX market should increase at about 22% per year and reach $2.4 billion by 1992.

PBX Market Revenues

Rank and Vendor		1988 Revenue ($B)	1988 Market Share (Percent)
1	AT&T	1.44	29
2	Rolm/Siemens	1.34	27
3	Northern Telecom	1.00	20
4	NEC	.50	10
5	Mitel	.25	5
6	Fujitsu/GTE	.15	3
7	Intecom	.05	1
8	All Others	.25	5
	Total	4.98	100

INPUT

LAN Market Growth

- The current LAN market is $1.7 billion.

- The computer networking market is expected to grow at about 35% per year over the next three years.

- 58% of all personal computers will be networked by 1991.

- The market is estimated to exceed $4 billion by 1991.

LAN Market Revenues

Rank and Vendor	1988 Revenue ($M)	1988 Market Share (Percent)
1. DEC	320	19
2. IBM	240	14
3. 3Com	200	12
4. Novell	150	9
5. Ungermann-Bass	90	5
6. Apple	90	5
7. Sytek	50	3
8. AT&T	50	3
9. Standard Microsystems	30	2
10. Proteon	30	2
11. All Others	450	26
Total	1,700	100

PC Market Revenues

Rank and Vendor	1988 Revenue ($B)	1988 Market Share (Percent)
1. IBM	5.79	19.3
2. Apple	3.75	12.5
3. Commodore	1.95	6.5
4. Tandy	1.89	6.3
5. Atari	1.38	4.6
6. Compaq	1.11	3.7
7. AST	.18	0.6
11. All Others	13.95	46.5
Total	30.00	100.0

PC Market Forecast
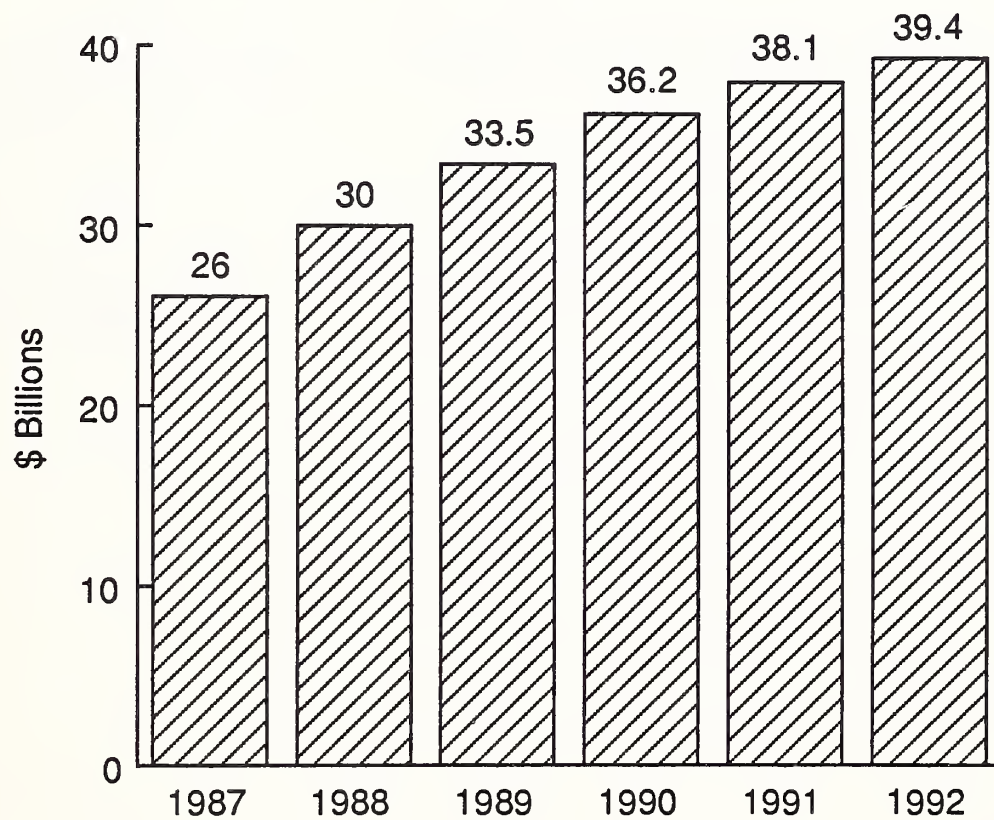
Microcomputer Workstations Market Revenues

Rank and Vendor		1988 Revenue ($M)	1988 Market Share (Percent)
1	Apollo	970	36
2	Sun	810	30
3	H-P	430	16
4	DEC	220	8
5	All Others	270	10
	Total	2,700	100

Disaster Recovery Technology

- Business appears to be a promising service area.

- Corporations pay a regular fee for guaranteed space on a backup computer.

- Service is interlinked with a telecommunications disaster recovery plan.

Disaster Recovery Technology

- Revenues estimated to be $150 million.

- Market comprises only 10% of the potential pool of customers.

ZBTI-47A

Disaster Recovery Market Revenues

Rank and Vendor	1988 Revenue ($M)	1988 Market Share (Percent)
1 SunGard Data Systems	60	40
2 Comdisco	60	40
3 All Others	40	20
Total	160	100

Customer Service and Support

H. W. Stigler
Manager, Customer Service Program
INPUT

U.S. SERVICE MARKET
1988-1993

Product	User Expenditures		
	1988 ($B)	1993 ($B)	88-93 AAGR (Percent)
Large Systems	1.2	1.4	4
Small Systems	3.6	5.1	7
Micro/Workstations	1.1	1.7	10
Peripherals	6.6	8.9	6
Total	12.6	17.1	6

U.S. TPM MARKET
1988-1993

Product	User Expenditures		
	1988 ($M)	1993 ($M)	88-93 AAGR (Percent)
Large Systems	102	113	2
Small Systems	373	492	6
Micro/Workstations	575	850	8
Peripherals	533	638	4
Telecom	151	222	8
Total	1734	2315	6

highest growth area

excludes PBX's & ?

TOP EIGHT LARGE SYSTEM* SERVICE VENDORS BY MARKET SHARE

Rank	Company	87 Revs ($M)	Market Share† (Percent)
1	IBM	1900	63
2	Unisys	410	14
3	CDC	156	6
4	Amdahl	125	4
5	Honeywell-Bull	120	4
6	NAS	116	3
7	Cran	100	3
8	NCR	75	2

*Includes Associated Peripheral Service Revenue
† Manufacturer-Supplied Market

TOP TEN SMALL SYSTEM* SERVICE VENDORS BY MARKET SHARE

Rank	Company	87 Revs ($M)	Market Share† (Percent)
1	DEC	1698	23
2	IBM	1600	21
3	NCR	900	12
4	Unisys	501	7
5	HP	424	6
6	Data General	261	3
7	Wang	255	3
8	Prime	190	3
9	Honeywell-Bull	160	2
10	AT&T	150	2

*Includes Associated Peripheral Service Revenue

† Manufacturer-Supplied Market

VENDOR SERVICE—A KEY ASSET

- Significant Revenue Source

	1987 ($ Millions)	Total IS Revenues (Percent)
IBM	7,691	15.2
DEC	3,087	29.7
UNISYS	2,002	22.9
NCR	1,556	30.7

- Key Ingredient in Cost of Ownership

- Key to Account Control

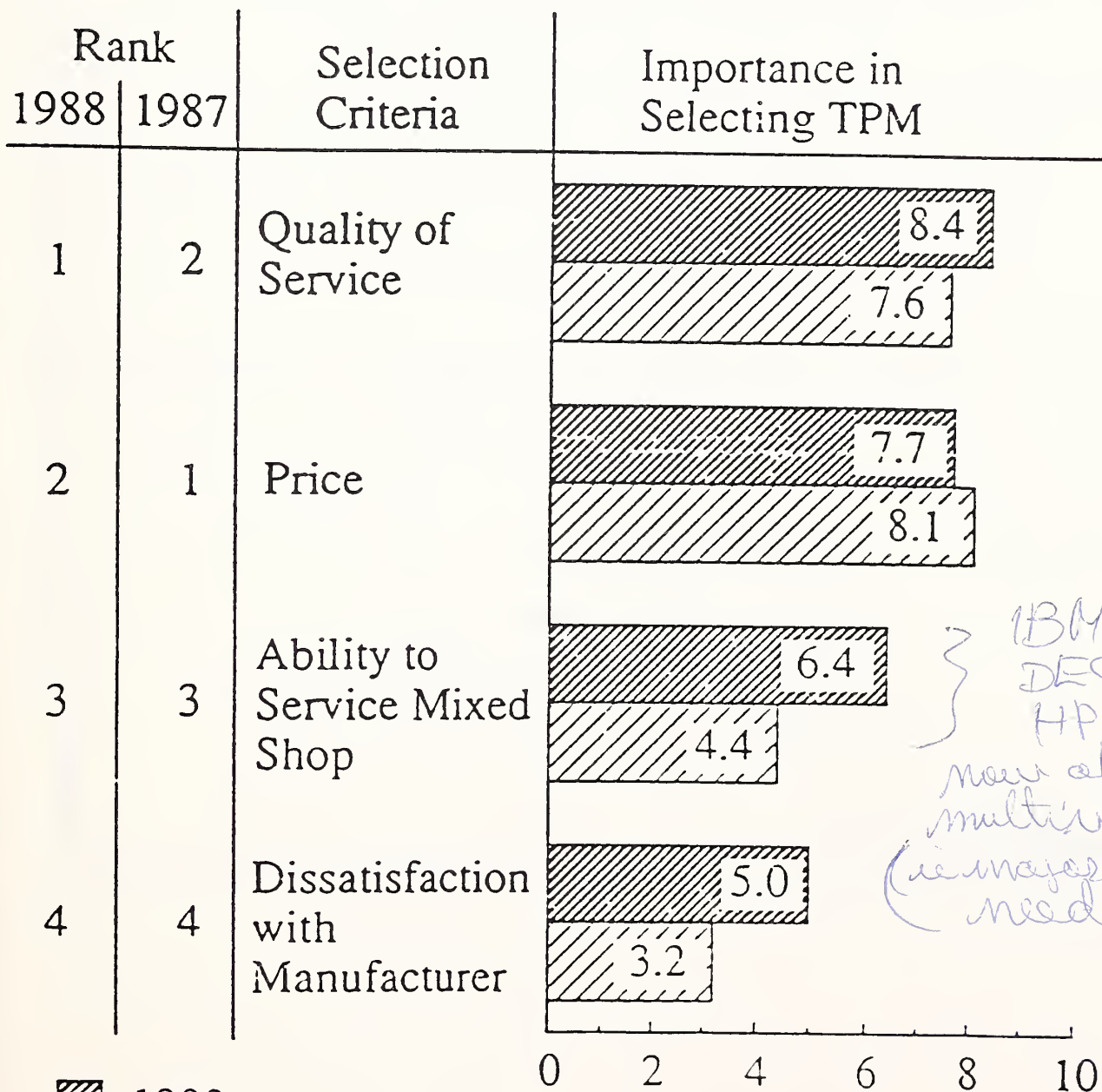- Key to Quality Product Support

- History of High Profits

Manufacturer

VENDOR CONTRACT COVERAGE

Large Systems	90+%
Small Systems	60+%
PC/Workstations	20-%

TOP TEN TPM'S BY MARKET SHARE

Rank	Company	87 Revs ($M)	Market Share (Percent)
1	TRW	255	15
2	Sorbus / Bell Atlantic	220	13
3	GE	198	12
4	Intelogic Trace	134	8
5	CDC	100	6
6	Idea Servcom	79	5
7	Decision Data / Momentum 150	70	4
8	Dataserv / Bell South	67	4
9	Unisys	45	3
10	Grumman	40	2

TPM SELECTION CRITERIA

Rank		Selection Criteria	Importance in Selecting TPM
1988	**1987**		
1	2	Quality of Service	8.4 / 7.6
2	1	Price	7.7 / 8.1
3	3	Ability to Service Mixed Shop	6.4 / 4.4
4	4	Dissatisfaction with Manufacturer	5.0 / 3.2

0 2 4 6 8 10

▨ 1988
▧ 1987

[handwritten notes:] IBM DEC HP now offering multivendor svce (ie major mkt) need

1988: THE SERVICE YEAR IN REVIEW
(January-March)

Date	Item
Jan. 1988	• MAI "Buys Back" MAI Service form Sorbus
	• Sorbus Lays off 600-650 Employees
	• CDC Matches IBM 24/7 Coverage
	• IBM Realigns Rolm Service Organization
Feb. 1988	• Sorbus Eliminates 700 Management and Staff Postions
	• IBM Raises TPM Rates 15%, Contract Rates 7-15% (Selected Products)
	• IBM Announces COS Site Management Service
	• Prime Announces 24% Increase in Service Revenue
	• DEC Announces 29% Increase in Service Revenue
Mar 1988	• Tandem Buys Grid Systems _what to do w/ Svce?_
	• IBM Buys Pactel Spectrum Services
	• DG Announces 7% Increase Service Revenues
	• IBM Announces Drop in U.S. Service Revenues

1988: THE SERVICE YEAR IN REVIEW
(April-June)

Date	Item
Apr. 1988	• DPCE Acquired BN Granada Group Plc.
	• Dataserv Lays off 66 Employees
May 1988	• Computerland Steps up Efforts to Sell Service to National Accounts
	• HP Announces Service Revenue Growth of 20%
	• CDC Offers Proact Software Support
	• TSSI Lays off 60 Employees
June 1988	• Datagate's Lawsuit Against HP Dismissed by San Jose Federal Court
	• Prime Announces Priority Replacemnt Sevice
	• IBM Unveils AS/400 ("Silverlake")
	• Intelogic Trace Offers Guaranteed Response and Repair Times for System/3X Users
	• IBM Offer Extended Maintenance Option Prepayment Discounts

1988: THE SERVICE YEAR IN REVIEW
(July-September)

Date	Item
July 1988	• Bell Atlantic Acquires CPX
	• AMI Suit vs. IBM Dismissed
	• DEC Offers New Business Service Plans
	• Grumman Sues DG for Antitrust Infractions
	• Datagate Suit vs. HP Dismissed
Aug. 1988	• IBM Expands TPM Capabilities with Technical Services Management
	• HP Announces Multi-Vendor Support Offering
	• CDC Offers Third-Party Software Support Offerings for IBM Software
	• TRW Acquires 3M TPM Business
	• Intelogic Trace Offers Guaranteed Response Times and Expands System/3X Coverage to 24X7
Sept. 1988	• DG Offers Multi-Year Service Plans
	• Sorbus Acquires Computer Maintenance Co. (Toronto)
	• Hitachi Establishes Own U.S. Support Centers
	• IBM Announces Network Support Services

1988: THE SERVICE YEAR IN REVIEW
(November-December)

Date	Item
Nov. 1988	• Idea Associates Acquires Servcom
	• GE Computer Services Put Up for Sale
	• Decision Industries Merges with Momemtum, Forms Decision Data Inc.
	• Ex-Sorbus Directors Form ICSS
	• DEC Changes Warranty Policy, Results in 6-9% Increase for Previous Support Level
Dec. 1988	• Bell Atlantic Acquires Dynservice Network
	• Sorbus Announces Layoff of 100 Employees
	• CDC Announces New VAX 8XXX Service
	• Idea Servcom Announces "Risk Free" System/3X of 4300 Service
	• AMI Files New Antitrust Suit Against IBM Over Microcode Copying

MARKETPLACE

- Discounting of Hardware Leads to Discounting Service

- Systems Integration Leads to Multivendor Service/ Support

- Users Releasing RFPs for Service

- TPMs Very Active

- Sellers to Buyers Market

- Special Bids/Let's Make a Deal!

STRATEGIC IMPLICATIONS OVERALL

- Reduced revenue and profit opportunities for base maintenance

    1st — Service of IBM products

    Followed by — Service of all vendors' products

- Total cost of ownership reduced

    1st — IBM products

    Followed by — All vendors' products

- User equity will emerge as a key issue as market changes from seller's to buyer's

- Key objective of hardware, software, and service vendors should be high availability at lowest cost

- Service offerings will broaden to cover everything a customer needs to achieve high availability at lowest cost

- Cost pressures and economies of scale will result in more mergers and acquisitions

INPUT

STRATEGIC IMPLICATIONS—VENDORS' FOCUS ITEMS

Hardware Product Managers
      Account Control
      Total Cost of Ownership (New Products)
      High Availability
      Third-Party Entry

Software Product Managers
      Improved Training, Documentation, On-Site Support

Service Operational Management
      Customers' Total Needs vs. Service Delivered
      Marketing of Service
      Cost of Service

Service Business Managers
      Equity
      Third-Party Entry
      VAR/VAD Support
      Third-Party Support
      Broadened Offerings
            Multivendor
            Network Management
            Ancillary Services

INPUT

# STRATEGIC IMPLICATIONS—TPMs
FOCUS ITEMS

- Reduced Margins Will Result in More Mergers/Acquisitions

- Sophisticated Support Will Be Required to Achieve High Availability at Lowest Cost
  - Remote Support
  - Parts Logistics

- Vendor Support Will Decrease, Prices Will Increase

- Key Strengths Will Be Full Multivendor Support and Level of Service

- Price Differential with Vendors Will Decrease

INPUT

IBM Telecommunications-Services Network Support

- Announced 9/88

- Assists customer in network management effort

- Applies to voice, data, and integrated voice/data networks

- Provides network problem determination and coordination assistance to customer call screening facility (help desk)

- IBM Network Support center available 24 hours/day

- Advanced network monitoring and diagnostic tools

- Network monitors and remote test computers installed when required

- Service management option available where IBM takes full responsibility for hardware service from all vendors

Telecommunication Services, Network Support
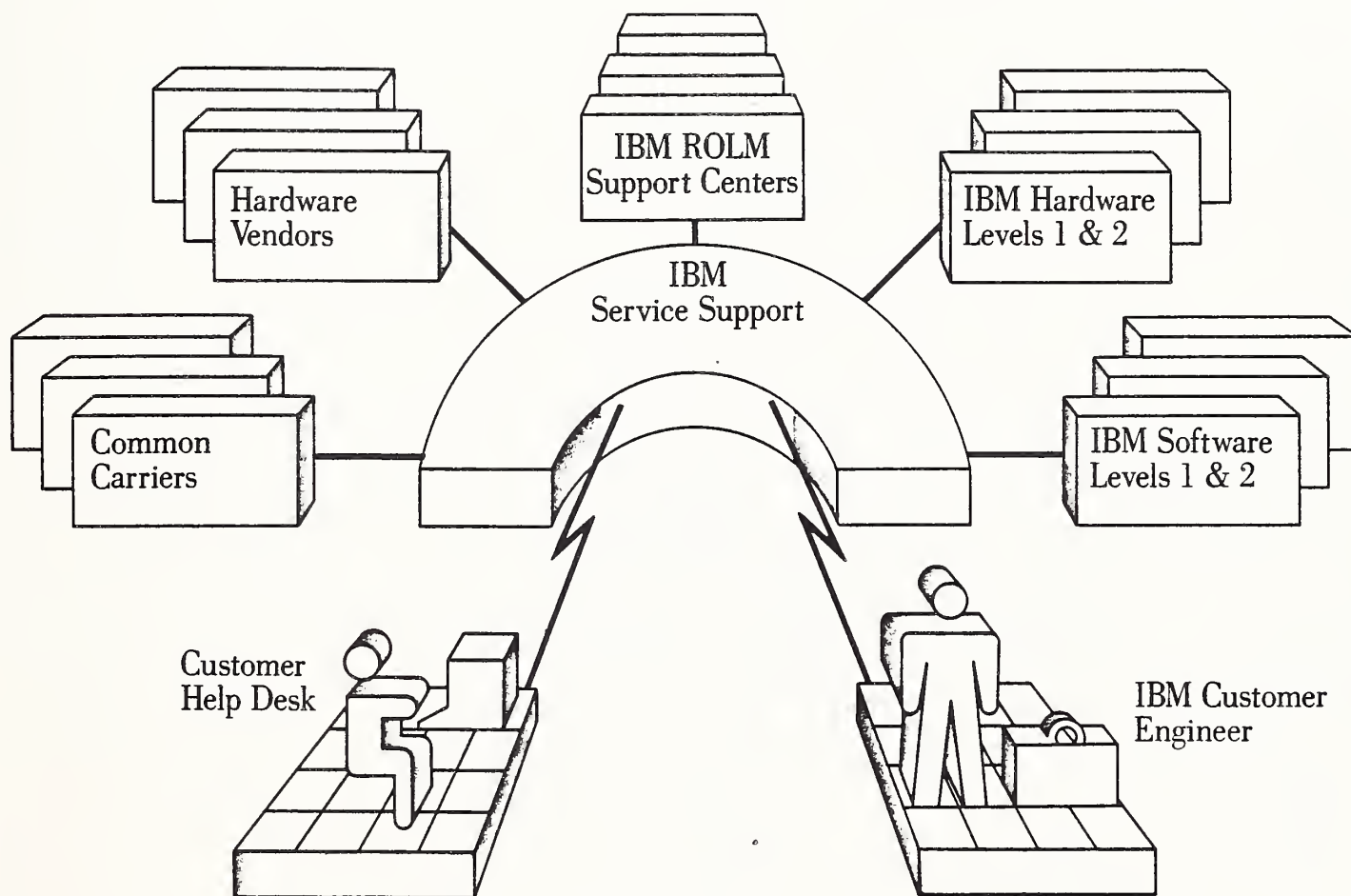
5 Required Product Support

- All Network Products Except Common Carriers

- End User Products (Terminals, W/S)

- Remote Network Management and Technical Support Skills

- Customer Network Data Base System

- Proprietary Network Management Software and/or Skill on Major Software Products (e.g., Netview)

Market Forecast Status

1. Desk Research Has Yielded a Wide Range of Uncomparable/Unintegrated Forecasts

   • Unclear Assumptions and Coverage
   • Unclear Definition of Terms

2. Comparison of "Top Down" Market Forecast with "Bottom UP" Forecasts in the Product and Service Overview Section May Raise More Questions than Answers

3. Primary Market Conclusions:

   • Today it's an In-House Market
   • The Outisde "Available" Market Barely Exists and Is Very Fragmented
   • Opportunity is to Develop Latent Potential
   • Market Profile
     - Type of Service
     - Size of Firm
     - Vertical (Industry)
   • Data Center Facility Management Is Model for "Full Telecom Services"

A 8 - 14B familiar

total Maint v. TPM

"order of magnitude best in dk"

show proportions

B. Show telecom TPM isn't big enough alone to supt available bus.
   ○ Vendor size
   ○ nationwide sept

c. Fast industry evolution? (assumption behind) best & risks) + & —

7. Recommendation to Reposition Report Topics

REQUIRED PRODUCT SUPPORT - An assessment of which of the products defined above it will be necessary to maintain to succeed in setting up a major third party telecommunications field service organization in the U.S. Also an assessment of the communications services it will be necessary to support for the network management portions of the U.S. BTI organization.

CUSTOMER AND VENDOR REQUIREMENTS DEFINITION - Requirements for network management organizations which provide both network management services and third party field services for network equipment in the U.S.

From the customer viewpoint what must be provided in terms of services and coverage (geographical, network equipment, and network services).

From the vendor (operational) perspective what is necessary to both manage networks and maintain network equipment.

Combine the Two Separate Discussion above into a Single Section Called:

BTI Business Model

1. Success Requirements:
    - Products/Services
    - Pricing
    - Marketing/Promotion
    - Distribution Channels
    - *Operational*

2. Emphasis more on Strategic than Tactical Issues (Service Offering vs. "Help Desk" Requirements)

3. Other Issues, e.g., Unions

Proforma P&L
risks - best & worst case
↳ eg OEM price cuts

III. BTI Strategy Options (Preliminary)

1. BTI U.S. Market Objectives

2. BTI Strengths and Weakness regarding U.S. market penetration

3. Strategy Scenario A

4. Strategy Scenario B

5. Strategy Scenario C

BTI U.S. Private Network Market Objectives

1. Third-party service offerings only—no interest in reselling network facilities

2. Rapid market penetration—major player within two years

3. Buy in-place capabilities rather than build new organizations from the ground up

Strategic Choice

Major Player   vs.   **Niche Player**
What: Broad Service/   Limited Product Line
         one-stop-shop

Large Revenues		Smaller Revenues	
Pros	**Cons**	**Pros**	**Cons**
1. Sufficient Corporate Impact	1. Longer Time to Achieve	1. Shorter Time	1. Not Big Enough to Make a Differences
	2. Bigger Investment	2. Smaller Investment	
	3. More Fierce Competition	3. Less Risk	
	4. Bigger Risks	4. Less Competiton	

INPUT

BTI U.S. Market Assessment

Strengths	Weaknesses
1. Telecom image	1. No established launching platform
2. Specialized expertise	
3. Financial strength	
4. Global "connections"	

not impt

Jim to provide brochures etc.

INPUT

BTI Strategy: Scenario A

Driving Principle: Target "Hot" Market Needs

Strategy	Implementation
Step 1: Acquire a Nationwide Field Service capability	Some Interesting Candidates
Step 2: Acquire an NMS capability • Product • Service	Avant-Garde _has UR mktg agreement w/ BTI_ • Image • AI work • Weak financially • Available
Step 3: Flesh out field service coverages (product and geography) by both acquisition and alliances	Long Shopping List

INPUT

BTI Strategy: Scenario B

Driving Principle: Target Industry (Vendor Side)
Opportunities

	Strategy	Implementation
Step 1:	Acquire a modem company • Customer base • Field service organization	• Declining future • Several available
Step 2:	Acquire T-1 equipment company • Netwide visibility • High growth area • Strategic position • Might pick up NMS system	• Expensive • N.E.T./IBM relationship
Step 3:	Flesh out capabilities via acquisition and alliances • NMS capability • Field service coverage (products and geography)	Many

(handwritten annotations in left margin:) fills in place of being (1) Multi-vendor (2) Adds not a service - hard to explain   describe BTI/Paradyne motives   give rationale of modern business paying for BTI foothold in U.S.

(handwritten annotation mid-page:) distraction of T-1 equip biz (prof drain)

INPUT

BTI Strategy: Scenario C
Concept Level Only

Driving Principle: Path of Least Resistance, Stealth and a
Global Perspective

Strategy	Implementation
Position BTI as full-service supporter of the international portion of (everyone's) networks	*this is a given*
Logically evolves into full-service capability for all domestic nets as well	

Builds:
- *o Credibility*
- *o Strong differentiating factor*
- *o Sell new level of foreign (ie US). network support to other continents*

INPUT

EXAMPLE

C O M P A N Y   P R O F I L E

Avant-Garde Computing, Inc.
8000 Commerce Parkway
Mt. Laurel, New Jersey 08054-2227
(609) 778-7000

Timothy P. Ahlstrom, President, Chairman, & CEO
F. Morgan Lamarche, Vice Chairman, Secretary, & Director
Public Corporation: NASDAQ
Total Employees: 147
Fiscal Year End: 4/30/88
Total Revenue: $16,733,000
Operating Income: ($2,663,000)

The Company

Avant-Garde Computing, Inc. (AGC), organized in 1978, designs,
produces, sells, and supports integrated software-based systems
which are used to help manage large data and voice communications
networks. These products are based on proprietary software which
utilize minicomputers, microprocessors, and real-time graphics to
support the management of networks. These tools help network
managers improve service, control costs, manage operations,
analyze performance, and plan for the future growth of the
networks.

The company has reduced its total number of employees by 15%
during 1987 and 1988. In keeping with its reorganization plan,
it has redistributed its employees into various divisions.

Division	Employees 1988	Employees 1987	% Change
Marketing	9	7	22%
Sales, Customer Support	59	49	17%
Engineering (R&D)	42	51	(18%)
Management & Administration	21	21	N/C
Operation & Production	16	45	(64%)
Employee Totals	147	173	(15%)

The company sells its products primarily to organizations which
operate large data communications networks. These organizations
have several large computers which are installed in one or more
sites. AGC's customers include insurance companies, major banks,
telephone companies, government agencies, and other large users
in the U. S., Canada, and Western Europe.

As of April 1988, AGC had sold 183 Net/Alert and Net/Alert Plus systems, 17 Net/Guard systems, and 4 Net/Command systems. Some customers purchased more than one system. The company sold 31 Net/Alert systems and 1 Net/Guard system in 1988.

The company's major products are:

- Net/Alert Plus (replaces Net/Alert) is a data network performance monitoring system which provides current and historical network status, performance, utilization, and availability information data communications network staff.

- Net Command allows operators of large networks to manage and control a number of network and host-computer monitoring, management, and diagnostic products from a single workstation.

- Net/Guard is a stand alone system which provides security and management for dial-up networks by controlling access from various terminal devices.

In May 1986, AGC signed a definitive agreement with British Telecom (BT), the major telephone company in the United Kingdom, granting them exclusive U. K. distribution rights for all of AVG's products. In 1987, BT established a separate organization within BT to sell AGC's products. This action was the result of BT's resale of seven Net/Alert products.

Avant-Garde Computing, Inc., announced in August 1988 that they had reached an agreement in principal for a major distribution and support arrangement with Concurrent Computer Corporation (CCC). CCC would distribute and support AGC equipment and services in Australia, New Zealand, other Asian countries including Japan, Canada, and the U.S. Government.

Company Strategy

Avant-Garde Computing, Inc., has undergone a restructuring in 1987 and 1988 in an effort to improve margins and to become profitable. The company has abandoned the development of several new products and now focuses on major enhancements to their more popular product, Net/Alert Plus and Net/Command.

The company also instituted a formal quality control program in 1987 to lend further support its significant repeat customer base.

In addition, the company has reduced its total employees by 15%, primarily in Engineering and Operations.

Financial Summary

Total fiscal 1988 revenues (fiscal year ending April 30) reached

$16.7 million, a 4% decrease under fiscal 1987 revenues of $17.3 million. Net income decreased by 64%, from ($6.4) million in fiscal 1987 to ($2.3) million in fiscal 1988. A five year financial summary follows:

Avant-Garde Computing, Inc.
Five Year Financial Summary
($ thousands, except per share data)

ITEM	1988	1987	1986	1985	1984
Revenue	$16,733	$17,358	$16,309	$20,437	$16,529
* % increase (decrease) from previous year	(04%)	06%	(25%)	24%	--
Operating income (loss)	($2,663)	($6,772)	($6,301)	$ 176	$1,876
* % increase (decrease) from previous year	61%	(07%)	(-%)	(91%)	--
Net income (loss)	($2,332)	($6,427)	($5,154)	$ 875	$1,434
* % increase (decrease) from previous year	64%	(25%)	(-%)	(39%)	--
Earnings per share	($ .62)	($1.71)	($1.40)	$0.24	$0.47
* % increase (decrease) from previous year	64%	(22%)	(-%)	(49%)	--

The company attributes a majority of its decrease of over $1 million in revenues to fewer sales of its Net/Alert product. AGC believes that this reduction is attributable to an increase in voice and data network complexity on high-speed (T-1) lines. This, coupled with marketplace confusion due to increased competition contributed to the decline in sales from fiscal 1987.

The Net/Command product generated $215,000 in 1988 reflecting introductory pricing.

Only one new Net/Guard system was sold ($167,000) during the same period. Total 1987 revenues for the Net/Guard product were $1.9 million, of which 72% was generated by a single customer.

System and upgrade sales in Western Europe increased by 29% to $4.2 million in 1988 from $3.0 million in fiscal 1987.

Total costs of sales in 1988 increased as a percentage of net

revenue to 56% from 53% in 1987.

Sales and marketing expenses for fiscal 1988 decreased 28% from
1987. As a percent of net revenues, sales and marketing costs
decreased from 45% in fiscal 1986 to 37% and 27% in fiscal 1987
and 1988, respectively. The reductions were the result of
reductions in compensation costs, promotional activities,
reallocations of sales expenses to service expenses, and staff
reductions.

General and administrative costs decreased $719,000 from fiscal
1987 and decreased as a percentage of net revenues from 20% to
17%.

Research and development costs for software and product
development were $2.5 million in 1988, $3.7 million in 1987, and
$3.8 million in 1986.

Litigation

Avant-Garde Computing, Inc., is in the process of defending
itself against two suits which were brought against the company
in 1985. One alleges company misrepresentation and the other
alleges that the company failed to disclose certain information.
While AGC believes that the ultimate resolution of these cases
will not affect the financial position of the company, they
intend to pursue a vigorous defense. The company provided
$100,000 in 1988 and $700,000 in 1987 to defend these cases.

Key Products

AGC's key products are based on proprietary software. These
products utilize minicomputers, microprocessors, and real-time
color graphics to assist network managers improve service, manage
operations, analyze performance, control costs, and plan the
growth of their networks.

*   Net/Alert Plus is the company's principal revenue producing
     product in fiscal 1988. It is a data network performance
     monitoring system which represents a major revision of the
     initial network monitoring product, Net/Alert. The new
     product offers enhanced graphics through a PC work station,
     and also provides new reports and features. It provides a
     real-time monitor of the status, performance, availability,
     and utilization of leased line networks.

*   Net/Command, the newest product, is an integrated multi-
     vendor network management system. It is a software-based
     system which allows operators of large data communications
     networks to control a number of network and host-computer
     monitoring, management, and diagnostic products from a
     single network workstation.

*   Net/Guard is a stand-alone system which provides security

and management of dial-up networks. Network managers can
secure and control access of personal computers and other
dial-up devices to the central network, databases, and
computers. Concurrently, the product monitors the status,
performance, utilization, and availability of the dial-up
network.

Industry Markets

SOURCE OF REVENUE SUMMARY

RANKING ORDER	INDUSTRY	PERCENT OF GIVEN MARKET
1	Manufacturing & Production	28%
2	Diversified Financial Services	20%
3	Utilities & Communications	18%
4	Commercial Banks & Thrifts	15%
5	Government & Defense	12%
6	Transportation	03%
7	Retailing	02%
7	Other	02%

Market Share/Competition

The integrated software network management market represented
about $175 million in 1988, and is expected to grow to $210
million in 1990. The market growth rate is increasing at about
10% per year. AGC had about 10% of the market in 1988.

The companies that appear to be in the best position to gain
significant market share in the large-scale network management
arena are those that sell T-1 equipment and associated network
management systems.

The data and voice network management industry is highly
competitive and includes such major players as IBM and AT&T.
These players have stronger financial, marketing, and technical
resources. AGC will encounter additional competition from these
companies as well as from new entrants.

Principal competitive factors include product performance,
reliability, upgrade capabilities, adaptability to a wide range
of communications environments, service, customer support, and
price.

To date, AGC has been able to compete through superior features; however, the company had to lower its price in late 1986 to meet significant price competition. Increases in competition may cause further price erosion.

APPENDIX A
SERVICES PROFILE

AGC's customer support has its own field sales and support staff as well as those provided by British Telecom, Concurrent Computer Corporation, and its other European distributors. The company maintains a field service organization and a hot-line for easy access to support staff. Hands-on training is also available.